The Builder.

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Bristol going ahead.

TO ascertain the part of the world from which the megalithic blocks which formed the prehistoric sanctuaries and fortresses of Stonehenge and of Avebury were derived is the object of a problem not unfrequently alluded to in our columns. Before the birth of the science of geology, indeed, little curiosity was felt on the subject. Stones, it was thought, were stones. There they were, and that was all that was to be said about it. A little later, when the investigations set so efficiently on foot by Cuvier were chiefly regarded in this country in relation to their supposed theological, or anti-theological, bearing, a clerical writer on Avebury gravely propounded the theory that the "sarsen stones," with which the tourist over the Wiltshire downs is so familiar, were "excreted from the chalk by the action of the deluge."

Not feeling altogether convinced by the arguments of the reverend gentleman to this effect, we yet felt disinclined to adopt the theory, which is that of what we will call geological orthodoxy, *i. e.*, that these stones were transported on ice-floes, and dropped on the melting of their sustaining blocks over the surface of what became afterwards the downs of Wiltshire. To our minds the theory (like many others), if admissible, only puts off the day of reckoning. If carried by ice the stones must have come from some original quarry or mountain face, no less certainly than if transported by human or by gigantic labour; so that, in fact, the geological explanation only added a second difficulty to the first. How they came was, no doubt, a question; but it was one which it would be more convenient to discuss when we knew whence they came. Nor could the ice-transportation theory throw any light on the distribution of the sarsen blocks, in some places on the highest parts of the downs, and in some (as near the Devil's Den), in lines and cross lines, that bear the strongest resemblance to the plan of a town.

A professional visit to Bristol, however, recently shed some light on the matter, by showing the "sarsen stone" used in the construction of a comparatively recent, and very magnificent, warehouse in the very heart of that ancient city, and at the side of the dock. Unmistakably there is to be seen the same stone of which the wandering "sarsens," as well as the gigantic circles of the ancient sacred capitals of the district, consist, a millstone grit (we venture to think), as superior to granite for building purposes as granite is to ordinary sandstone. The building in which we found it is called the Counterslip warehouse, and was erected as a sugar refinery, with a prodigality of cost, and an excellence of workmanship, which it is rare,—as far as we know, unexampled,—to find out of a Government dockyard, or the like locality. Four substantial floors are supported on iron pillars. There are chimneys on which experiments, such as those recently cited in our columns, might be satisfactorily repeated. And throughout is the trace of the sound workman unstinted as to cost, so that his work is what it ought to be. And here, as quoins and lintels, we recognised the sarsen stone.

For any student who has the opportunity to undertake an excursion that might associate his name with one of the most interesting problems that regard prehistoric England, here is a good opportunity. Let him trace the quarries whence the stone for this refinery was brought. It cannot be an impossible, nor, we should think, a very difficult, task. Bounding our own observation to what could be seen from railway, road, river, or tramway, we saw fine outcrops of stone, which we will not venture on such slight acquaintance to identify with this stone, but from which it did not seem unlikely that blocks as large as those of the Avebury *cella*, 18 ft. square, and 2 ft. or 18 in. thick, might have been procured. At all events, this is the vicinity in which the stone exists. That is one step, and, we venture to think, an important one. And whatever may have been the means of transport commanded by the ancient builders, a degree of strong human interest attaches to the fact that it is not necessary to have recourse to the services of imaginary icebergs as carriers from Norway, or from the mountains of the moon. Those who could build Stonehenge and Avebury,—and our own opinion has been before expressed that they were masons, and that the great stones were wrought,—could have found means of transporting their materials from the mouth of the Avon, which probably was a much better or, at all events, a much fuller, waterway in their time than it is at present.

Not that we would speak with any disrespect of the navigation of the river Avon, as it is at the present moment. Its seven locks are of the noble dimensions of 108 ft. long, and 18 ft. 6 in. wide, with an average fall of 9 ft. And Avonmouth Dock, which is called the Bristol Port and Channel Dock, is certainly one of the finest in this or in any other country. It is 1,400 ft. long by 500 ft. wide, affording about 16 acres of water. Its entrance into the Severn, close to the King's Road, is by a lock 454 ft. in length and 70 ft. in width; and the depth of water over the sill of the lock, in equinoctial spring tides, is 42 ft. At ordinary springs the depth is 38 ft., and at ordinary neaps 26 ft. The retention of a mass of water of this height by a single pair of gates of 70 ft. opening is an achievement of which the engineer, Mr. Brunlees, may be justly proud,—no less than of the perfect ease with which, on the moving of a lever, and with a preliminary subterranean rumble of loose chain, the great gates slowly roll back, with the apparent ease of a drawing-room door.

The dock is in connexion with the inland railways by means of branches to the Great Western and the Midland lines. But it is more likely to attract attention as being the English Port Said which has been selected as the base for the great campaign for the free opening of our waterways. The enterprising directors of the dock are putting themselves at the head of a movement for restoring the activity of that noble system of water-carriage which, linking together the Severn, the Thames, the Trent, and the Mersey, was the original basis of the great prosperity of English manufacture and commerce at the beginning of the century. We are not about to imitate a well-known example, and endeavour to measure how far this prosperity was due to one cause, and how far to another. Among the names of what we may call the great physical benefactors of the human race the palm may, perhaps, be accorded (with a reserve in honour of Jenner) to James Watt. But even the invention of Watt would have done comparatively little for us, without the aid of Brindley and of Arkwright. All concurred. The steam-engine enabled man to use heat instead of manual or animal labour, and this was, indeed, the mother invention. But the inventor of machinery set the mighty, though beneficent, demon thus raised to execute a work more profitable, if less interminable, than that of twisting ropes out of the sand of the Solway. And Watt's pistons, and Arkwright's spinning jennies, would have had but a restricted field for their activity but for the opening afforded for the transport of their produce by that which always has been, and always must be, the cheapest of communications,—the waterways.

It should be remembered, alike by those who would attribute the chief influence on national prosperity to legislation, and by those who would attribute it to railways, that our first spring, and, indeed, our most rapid proportional advance, was made before any one had dreamed of either "liberating legislation" or locomotion at sixty miles an hour. The first source, condition, and measure of national increase in wealth and productive energy, is the increase of population. It was in 1737 that the Royal assent was given to the first Act of Parliament for the Construction of the Bridgwater Canal. This Act was followed by successive Acts for the same work, in 1759, 1760, 1762, 1766, and 1795; and the completion of the canal, at the cost of upwards of 220,000*l.*, out of the private means of Francis, Duke of Bridgwater, was perhaps, in its consequences, the most splendid

gift with which any Englishman ever endowed his country. True, it brought in to the Duke a revenue of 130,000*l.* a year; and did he not deserve it? He ran near the verge of beggary in proving his faith in the genius of Brindley, and meet was the recompense. We wish his mantle would fall at this moment on the shoulders of a worthy successor, for the work has to be done anew. Not done, be it remarked, under the disadvantage of fear of failure, but under opposition acting from the fear of success. It is no longer a question whether a canal is not the necessary attendant on the factory, or whether its service can be replaced, at equally low cost, by any other method of transport. But it is a question how far those who have embarked large sums of money in another series of noble enterprises, which, rightly viewed, ought no more to be regarded as competing with canals than the navy as competing with the army, shall be allowed, alike to their own loss and to that of the country, to lay greedy fingers on a traffic which can be carried on by canals at a profit at less cost than by railways at a heavy loss.

By 1737, according to careful abstract of our legislation as to canals, made by the Freiherr von Weber, in his book, "Die Wasserstrassen Nord-Europas," thirty-eight Acts of Parliament had been passed for the regulation of our inland river navigation; the earliest of which, in 1423, *temp.* Henry VI., related to the Thames. By the close of the eighteenth century the number of such Acts amounted to 116, many of which were for the construction of canals. Here was the base which fed the increase of our population, from 1800 to 1840, at the rate of 66 per cent. for the whole period, or a little over 1¼ per cent. per annum, a growth altogether without precedent before the establishment of inland navigation, and greatly diminished since its recent discouragement.

The year 1840 is one which may well be taken as a turning-point, not only from convenience of calculation, but as marking a time when canals were at their zenith, not yet strangled by the railway companies, and when the latter were also at their best, and on the road to the ten per cent. dividends which they obtained before they meddled with the canals. The average passenger and goods receipts on the London and Birmingham Railway for 1840, '41, and '42, were 789,652*l.* per annum; the working expenses were 222,879*l.*,—less than 30 per cent. The first direct attempt on the part of a railway company to obtain possession of a canal was in 1845, and by that year the London and Birmingham Railway divided ten per cent. on its original shares. The fatal work of canal acquisition, unchecked by Parliament, though admittedly in defiance of public policy, rapidly proceeded. In 1845 railways acquired control over five canals, in 1846 over ten, in 1847 over seven, in 1848 over three,—the twenty-five canals in question being the very keys of the through navigation of the country. And it is matter for serious inquiry how far that collapse of industry which we have been accustomed to refer to the "Railway Mania" of 1845 has been caused or exaggerated by the mischievous policy adopted with regard to canals; mischievous in two ways,—first as murder, and secondly as suicide,—first as blocking from the canals the traffic which they could carry cheaply at a fair profit, secondly as throwing on the rail a traffic which it costs three times as much to transport by rail as by water. Let it be noted, moreover, that as soon as a railway attains a fair amount of trade, every slow cheap train displaces at least three quick and lucrative trains. At all events, the concurrence of the two conditions of activity in canals and of increase in prosperity is indisputable. Railway dividends have declined in proportion to the extension of the mineral traffic on trunk lines. The canals, which formerly paid 20, 30, and, in one well-known instance, 128 per cent. per annum, are reduced to comparative penury; and the country is doubly the sufferer,—first by the loss of this great item of natural wealth, and secondly by the high rates of transport imposed on all places to which there is no water competition.

However we measure the increase of the national wealth, it is certain that it has undergone a very material check since the seizure of the canals by the railway companies. From 1800 to 1840 the increase of population in the United Kingdom was 66 per cent. From 1840 to 1880, it was only 30 per cent., or at less than half the rate attained during the canal period. From 1800 to 1854 (we are obliged to take the closest dates given in the returns of the Board of Trade), the yield of our coal mines, which measures the activity of our steam power, was multiplied by six and a half, being an increase at the rate of a little over 3½ per cent. per annum, year after year. This rate continued unchanged to 1872, since which it has sunk to 2 per cent. per annum, or three-sevenths of the former rate. From 1800 to 1840, during the canal period, the tonnage of vessels cleared outwards from our ports increased at the average, and enormous, rate of 8 per cent. per annum,—year by year, note!—for forty years. From 1840 to 1872, the increase has been 4¾ per cent. per annum, and from 1872 to 1880 only 4 per cent. And in 1881 there was a decline of 786,000 tons from 1880. Without attributing this altogether to the stoppage of canal transport, there can be little doubt that this was one of the causes of the decline. And the decline from 1872 to 1880 of 34 per cent. in our cotton exports, of 46 per cent. in our wool exports, of 34 per cent. in our silk exports, and of 30 per cent. in our flax exports, throws a very lurid light on the policy, avowed before the Select Committee on Railways, of charging the highest available rates of freight for carriage on railways, where no water competition exists, and of carrying cheaply only where there is already a cheap sea or other water transport. The difference between the canal cost of ⅛d. per ton per mile, and the lowest rate at which a railway can remuneratively carry, is enough to keep rails, castings, and every kind of heavy goods out of the market, and is the reason for that migration of our industries to the seaboard and the valleys of the navigable rivers, of which we have recently given such striking examples.

It is thus with extraordinary interest that Manchester, Wolverhampton, Birmingham, and other great inland centres of industry will watch, and no doubt will aid, the movement now set on foot in Bristol for restoring to the inland districts that free water communication which nothing can rival in cheapness and in convenience. It is a curious remark,—and in making it we desire to acknowledge fully the immense benefit conferred on the world by the introduction of railways,—that in two signal instances among our first great railways the children have shown strong parricidal instincts. Manchester made the first English railway, and Manchester is now so barred from the sea by what, in the language of Mr. Peter Spence, she calls the "Railway Ring," which charges 7s. 6d. for transport that can be effected by common road for 6s., and by canal for 1s., that she contemplates bringing the sea inland, and probably will carry out the bold intention. Bristol was the cradle of one of the most magnificent works that ever sprang from a human brain, the Great Western Railway as designed by Brunel. And Bristol, according to the evidence of Mr. Wills before the Railway Rates Committee of the present year,—evidence that every one should read,—appears to be the object of what he considers a spiteful persecution by the Great Western Railway Company. That such is intentionally the case we do not believe. But that a portentous blunder underlies the policy of carrying cheaply only where there is competition, and charging as much as possible everywhere else, we have not the slightest doubt. Nor have we any more doubt that the adoption of a sound mercantile policy, based on a scientific analysis of full debtor and creditor accounts, such as that established by Mr. Rae, and his successor Mr. Goodchap, on the New South Wales Railway, would enable the Great Western Company to raise its dividend to six, to eight, and probably to ten per cent.

Under these circumstances,—the truth of which it is easy for any one who will take the trouble of studying the statistical returns of the Board of Trade to verify,—we are happy to welcome and to chronicle the revival in Bristol of that sound old mercantile spirit,—bold and yet safe, lucrative and at the same time patriotic in its outcome,—which made London what it is, and which, from the days of Sir Richard Whittington, was the proud characteristic of the British merchant. We do not wish to say anything uncivil to those who have, after all, done so much for England as her railway directors. But it is impossible to deny the fact that the policy, as stated before the Committee on Railway Rates, and as defended in the columns of a contemporary by Mr. Farrar, is a purely selfish policy. Not, we observe, a policy of enlightened selfishness, for that, in the long run, respects all interests; but a policy of giving to those who have much, and of taking away from those who have little: of charging prices that do not pay to towns that have a choice of sea carriage, and of making up the loss by disproportionate charges on those towns that have no alternative but to pay. This is not our picture of the case; it is plainly, not to say cynically, avowed in the pages to which we have called attention. Now, this, if a lucrative, is not a patriotic policy. To our eyes, it is as sure to be a losing one in the end to the companies themselves as it is injurious to the country. The man, and the association, that enriches itself while serving the country, is, like the famous portraiture of Shakspeare, "twice blessed." A truly sound mercantile policy "blesses him that takes and him that gives." A policy that is founded on ill-advised competition must be, to speak out honestly, a policy of extortion, and we believe that its natural result is ruin.

It is a remarkable proof of the depth to which the sense of the importance of securing the cheapest mode of transport has penetrated the manufacturing and mercantile classes of society in England, that we see, at the same moment, in two such different localities, Manchester stretching her hands towards the sea, and Bristol preparing to push her water transport into the heart of the Midland district. Bristol, once the second port in England, is now the eleventh in the order of her tonnnge. Will she ever regain her former pre-eminence? More unlikely things have occurred. It is not attempting to prophesy to say that that port, or that city, which adopts and enforces the sound principles of true mercantile policy which have made England what she is, will thrive and grow, while those cities and ports that hug themselves on a selfish and short-sighted policy will dwindle and decline. As to command of coal,—the mainspring of industry,—Bristol is no whit behind hand with Liverpool. The imports and exports of the latter port amounted, in 1880, to 191·4 millions sterling, those of London itself being only 194 millions. Bristol comes after with only 10 millions sterling of trade. But during the last twenty years, while the shipping of Liverpool has increased by 59 per cent., that of the Tyne has increased by 85 per cent., and that of the Clyde by 103 per cent. Is there not a warning in these figures? Proud, and justly proud, of her quasi-metropolitan dignity, Liverpool seems to have forgotten that a port must have two legs to stand upon. Her command of maritime trade, except for purposes of call and of re-shipping, can do her little service unless she has equal command of the free channels of internal traffic. It is of no use to receive food unless it be distributed through the system. The facts which have been recently brought to light as to inland transport from Liverpool are of extreme gravity. Whether as large holders of railway property, or as a great corporate body, the merchants of Liverpool have the deepest interest in being able to send their imports into, and to receive their exports from, inland Lancashire and Yorkshire by the cheapest possible route. How far this has been lost sight of we have seen. Manchester now meditates a blow, which, if delivered, will deprive Liverpool at one stride of half her wealth. And Manchester, it is only fair to say, only meditates this blow as a measure of long-suffering and long-provoked self-defence. We have before expressed the opinion that, on general grounds, the location of ports on the seaboard, with canal communication for heavy, and railway communication for light, inland traffic, is the true mode of developing to her utmost the natural resources of a country. The recent decision of the Provisional Committee shows that they have given full attention to the considerations we suggested (vol. xlii., p. 763, and vol. xliii., p. 58). But if the port neglects, or even aids, in choking up her inland outlets, the case is widely altered. Mr. James W. Harvey, in a letter to the *Manchester Guardian* of the 11th current, calls attention to some serious difficulties (apart from those caused by the railway companies) in the way of an adequate canal service between Liverpool and Manchester. His arguments have great weight. If Liverpool only cares to increase her dues, and neglects to keep open her inland outlets; if the combined five railways and two canals between Manchester and Liverpool, instead of emulating one another in the cheapness and convenience

with which they can supply the great centre of consumption, Manchester, from her present great centre of maritime income and outlet, Liverpool, only combine to keep up extortionate rates, neither Liverpool nor the railways will prevent Manchester from turning herself into a seaport. The engineering science of the day can overcome what is the true difficulty in this case,—the construction of low-level docks at an enormous cost. For the difficulties of navigation to Manchester, they reduce themselves to one,—that of the purse; and at that, unless we are mistaken, Manchester can afford to laugh.

France and the United States are rivalling one another in the enormous sums which they are expending in perfecting their inland navigation. And the reason is, that men of business, in France and in the United States, have quietly put to themselves the question, "How shall we secure the cheapest possible inland transport? Through Belgium extends a network of 1,250 miles of inland waterway, the dues on which are not more than enough to maintain the safety of the canals. To that we must come in England, if English manufacture is to hold its own in competition with that of countries provided with free inland water carriage. Manchester regards, and wisely regards, her own need in this respect. Bristol, looking at the need of the inland district, will enrich herself in supplying that need. But all England is interested in the possession of a free inland water communication,—costless, except for its own maintenance. And it is our opinion that those localities which first bestir themselves towards attaining this great national desideratum will be the first participants in the wealth which they will thus aid the nation to acquire.

WANTED! AN OPERA HOUSE.

IT is a strange enough fact, not perhaps quite easy to fully account for, but a certain one, that there is, in so vast a city as London, filled as it is with all that the highest civilisation can afford, but one opera-house. True it is that efforts have been occasionally made to add another to this one; but, as it would seem, only to fail. How this is, with so very many theatres round and about us, it might be hard to say, for so many considerations crowd on us in the endeavour to account for it. That it is a fact is certain. And not only is this so, however to be accounted for, but the "season" for the one only is for so short a time, a few weeks only, that there is but small,—if, indeed, any,—chance of even the upper world of London seeing or listening to many of the most famous of the great compositions of the gifted few who have had it in them to write those unique works. A rare combination of faculties and endowments would seem to be needed to write an opera, and to bring so much of that which is purely mental and musical thought and inventiveness to what may almost be termed a practical purpose. The men and women in an opera must needs talk and act for a time in music, and the very music itself must tell the story of what is going on, and how. Operas are thus quite apart from the usual "stage" business, as visible and listened to in "plays."

Operas and operatic performances being so exceptional, and demanding so much in those who invent, and in those who realise them to the public ear and eye, it would seem that no amount of cost and art-thought would or could be well spared in providing a due and proper place for the representation and rendering of a fine opera. In listening to so magnificent a creation as the "Don Giovanni" of Mozart, or the "Fidelio" of Beethoven, all must needs feel, who at all care for such things, that it would be impossible to over-estimate them, or to wonder too much at them, or at the powers displayed by their authors in the planning of them, and in the working out of their details. The subject is a very complicated one, and we can here touch on but one or two aspects of it which seem to us to call for more especial attention, and which, if thoughtfully taken into consideration by those who have the management of such things, might, as we cannot but think, do some service. Operas are artistic works, and call for not a little from artists of many kinds and degrees of power. Nothing, perhaps, in the whole range of art demands more: there is the author of the libretto, the composer of the music, the actors and singers, and the instrumentalists, and what most concerns us here, the house in which the performance takes place; and the scene-painter, and we can but add it,—for he has, as things are, not a little to do,—the artist who should regulate the lighting of both house and stage.

We have been led to some thoughts on operas and operatic performances and requirements, from contrasting the music of the "Don" with the place in which it is now necessarily given to the world, and in the hope of in time seeing a something better provided. It would, perhaps, be difficult to contrive a place less happily adapted than the present Covent Garden Theatre for such a purpose as this of opera music. We go to hear, as well as to see; to hear, more especially and emphatically, and also so to hear and see that nothing shall distract the attention of either eye or ear from the stage and music. But how are matters here? In all theatres we are looking at the stage, and not at the house, yet at Covent Garden so brilliant is the light from the huge and ungainly chandelier of glass suspended from the roof that it all but hides the stage from those who otherwise can but see it, but are supposed to see the stage uninterruptedly from the gallery and the gallery stalls and even upper boxes. This may, perhaps, have been unnoticed by those who can so readily mend such matters; and we can but hope it will be, for we do not hesitate to say that very much is and must needs be lost by it, even by those who witness the performance from a lower, and in many ways more, favourable point of sight. But it is to the ear that opera more particularly addresses itself, and this gains by distance, for the instrumental music is thus softened, and is made to so impress the ear as to seem to come in its unity from the conductor's *bâton*.

We may here, perhaps, usefully say a few words on this world-famous opera, the "Don Giovanni" of Mozart, and on the special way in which it is presented or not presented to the public ear and eye at Covent Garden many times during each opera season, and on the scenery and the special architecture which are made to do duty, and thus to aid and support the music of it; for in spite of the brilliant attractions of the house and the absorbing splendour of the music, it is impossible altogether to be blind to the scenery of this famous opera. Anything duller or less suggestive, or indeed dingier, is scarcely to be imagined. No attempt whatever would seem to be made to harmonise the different scenes, or to make them in any way suggestive of the time and place in which the action may be supposed to have taken place. Anything, indeed, in stock would seem to do for the "Don," and so bad and incongruous is it, that all sense of unity and continuity is utterly lost. It is a pity, indeed, that this is so, for one at least of the elements of opera, which no less a celebrity than Rousseau declared to be an essential, is even worse than absent. A something is in the place of it which had far better be absent altogether. A room utterly bare, or an empty vault, must be better, thus leaving the dramatic music to do the whole work and to tell of what is going on.

Mozart composed this greatest of operas in 1787, for, as he said, "himself and his friends." It found its way into England in 1817, when we are assured that it was performed in a way that has not since been equalled. And we thus allude to it in the hope that effort will in time be made,—shall it be in the next year?—to improve a little on what is now done. We dare not go into details, but it is hardly to be estimated how great is the art loss, and perhaps must needs be when no architect, or even upholsterer, has been consulted as to the unity and fitness of the scenic details, and no painter's eye has been brought to bear on the glare of the house, putting out, as it needs must, the very stage itself, its scenery, and the action on it. The very "constituents" of opera are, according to the great authority we have just quoted, the poem, the music, and the "decorations," or scenery, and to those we would venture to add the place, or "house," in which all goes on, and its fitness for its special purposes, and perhaps, we are disposed to think, as much as anything the method of its lighting. On the poor way in which this is now managed at Covent Garden nought need be said, further than this,—that it could hardly be more destructive of all scenic and pictorial and dramatic effect. The purpose of the "decorations" is to provide fitting objects for the eye to dwell on, and to aid the dramatic effect, and thus to add to, and not to mar, the work of the music.

We would fain say a word on the music of this great opera and on the singular fact, for fact it is, that but for the "Italian opera," as it is termed, there would needs be a vast gap and a want which it would, as we can but feel, be impossible to fill up. We speak of the fine instrumental band which, but for it, would hardly have existence either in numbers or quality. Right well does it do its work, and would do yet better if the house were better or at all adapted for such work, and how worthy of all effort and painstaking the rendering this music of "Don Giovanni" is none need to be ever reminded. That the illustrious composer was at his best, and was indeed inspired, when he wrote it, is certain. Its glorious and ethereal tones never pause or flag for a moment from beginning to final ending; from the first bar of the overture to the last note, as from the abode of the lost, there is nothing wanting. It is all but perfect work, and is on a level, as a work of the very highest art, with the "Hamlet" of dramatic art, and the music of it is so essentially dramatic that it takes the place of words in power of description. Such a work evidences the power of sound, as it does the wonderful inventive powers of its author. It is worth a house built of real and solid materials, thus to add to the power of the band and voices, and to their interpretation of so magnificent an art-thought.

WHAT ARE THE PROPER LIMITS OF CONSERVATISM IN REGARD TO ANCIENT BUILDINGS?*

WE live in an age of what are sometimes called "movements." We can all particularise a considerable number of such movements in the regions of politics, theology, and social life. We have had the reform movement, the evangelical movement, the ritualistic movement, and the women's rights movement, and other smaller intellectual and social upheavals of the same kind. The world of art has conspicuously shared in this general tendency of the mind of the day. Five-and-twenty years ago lovers of painting were scared by the pre-Raffaellite movement; more recently lovers of music have been scared by the Wagner movement. Almost all such movements have two characteristics in common. They are almost always taken up by a large number of persons who know not why they give their adherence to the particular standard set up, but who follow a fashion, without logic or reason, because it is a fashion, and because they are gaping for novelty; and all of them tend (more especially in art and literature) to give rise to a counter movement, a swing of the pendulum in the opposite direction.

If we keep our eyes open to this general tendency of the day, we shall probably conclude that the particular movement we are considering this morning is not an abnormal phenomenon, but is only one example of the prevalence of rapidly-changing fashions which is to be observed in the world of art as much as in that of politics and of society, and has the usual characteristic of movements arising out of fashion,—viz., that many persons follow it without knowing why. Numbers of people are at present exceedingly excited about, or rather against, the restoration of ancient buildings; but it may be doubted whether nine-tenths of them have ever seriously considered the subject, or are even acquainted with the main facts of architectural history; and the vehemence of opinion entertained and expressed in the matter seems, as far as my observation has gone, to be usually in inverse proportion to the knowledge of the subject on the part of the anti-restoration zealot. And, as in the case of other movements, this somewhat extravagant zeal is the result in great measure of a reaction against an opposite extreme. Let us see if we can get at the balance of truth between the contending parties.

The movement against which we are now "re-acting," the restoration movement, did not grow up alone; it was closely connected with, if it did not actually arise out of, the High Church movement. With the idea that a new life was to be infused into the Church by a revival of pre-reformation theology and ceremony, came naturally the idea that the buildings also should be revived, that they should be raised from the state of neglect and disfigurement

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into which many of them had certainly fallen, and that where possible they should be restored to something of their ancient beauty. The Ecclesiological Society, under the motto, *Donec Templa refecimus*, gave the cue, and the restoring of churches became one of the watchwords of educated society; and he who admired unrestored churches, or who objected to giving his mite towards restoring them, would have been called a "Philistine," had that expression been in common use in this country at the time. How church committees and architects acted under this *régime* we all know; how they swept away galleries, laid down Minton's tiles, and inserted Mediæval metal work from Southampton-street; and how they recased the exterior with new stone, scraped the old stone, imitated the old mouldings where decay had gone too far for scraping up; put in stained glass "by the most eminent firms," and made the whole as good as new. By such proceedings were deans and committees covered with glory, and architects' pockets filled with bank notes. The reverse of fortune began when first a few people, and then an increasing number, began to find out that some of the artistic significance and a good deal of historical value was eliminated from churches that had been restored; that the new work, however carefully worked in accordance with the old details, was not like old work in one sense,—had not the same feeling, was not interesting to sketch; and that it was too like old in another sense, seeing that to future generations it might remain somewhat difficult, after time should have reduced old and restored work to much the same texture, to say which was the genuine Mediæval Gothic and which the nineteenth-century imitation. This negative feeling against restoration seems to have been strengthened at the same time by a positive feeling in favour of much work which the Mediæval restorers had swept away as uninteresting and "Pagan." The revived Gothic being only an imitation art after all, palled on people after a time, and they got up another imitation,—that of eighteenth-century architecture,—as a change; and thus the old pews and galleries which the Gothic restorers had made conscience of clearing away, came now to be regarded reverentially as objects of artistic as well as of historic interest. Lastly, the reactionary party having come to the conclusion that there was and could be no real architecture in the present day, the impulse and spirit of architectural art being dead (a conclusion which it must be admitted many of the buildings in the now fashionable style amply justify), laid it down that it was an artistic crime to meddle with, alter, or add to any existing building, or part of a building, in any way; that "whatever is, is right," to the extent, at least, that whatever has been put up for a certain number of decades (not quite defined yet), however ugly, inconvenient, or useless for present needs it may be, has, by its mere existence, acquired a right to remain; that no one ought to touch a stone or a timber of an old building in the way of destruction; that to attempt to restore that which has wholly or partially decayed is a foolish and wicked sham, since no work done in this century can really reproduce the spirit of a former period; that the only right thing to do with any old building, however large and important, is to prop it up as long as possible with brickwork and shores, and reverently to contemplate its decay; and, generally, that any one who would take any other and more active course must be either a hopeless Philistine or an unprincipled person inspired by the worship of "Five per Cent." Society, to a great extent, has, for the present, taken up this way of looking at the matter, as the last novelty in taste; and thus we have the absurd contrast that, while five-and-twenty years ago it was considered a mark of stupidity, and of being below the level of average culture, to be indifferent to the restoring of old buildings, it is now supposed that to be a restorer or an advocate of restoration is an indubitable mark both of stupidity and vulgarity.

That seems to be about the creed of the anti-restorer of the day, as expressed in an often very defiant manner, through the mouth of its representative Society and its supporters in the press, some of the latter of whom carry on their attacks against any architect who may have ventured to pull down a dilapidated and useless building, with a rancour and an apparent disregard for common fairness which are very discreditable. We might, if we liked, amuse ourselves by picturing the aspect which one of our churches or cathedrals would have assumed by this time, had it been left to the custody of the anti-restorers; what a picture its interior would present, filled with all the heterogeneous furniture which different churchwardens at different dates had placed there; its roof-timbers bandaged with iron and propped in places from the floor, and the crown of an arch, which had hopelessly settled, held up by a brick column built up under it,—"reverently," of course. But the first thing to say in the way of serious criticism, in regard to this theory of the treatment of old buildings, is this, that it is something absolutely novel, it is the assumption of a principle which has never been recognised or acted upon in the whole previous course of the history of architecture. In every period hitherto men have not hesitated to sweep away a building which was in their way, which they did not want, or on which they thought they could improve. Had the Mediæval architects not done so, many of the most beautiful specimens of Mediæval architecture would never have come into existence. There is hardly a cathedral in England parts of which do not stand on the foundations of an earlier building, pulled down without scruple because the later builders preferred to build in their own style. William of Wykeham, one of the most honoured among the few names that are known in connexion with Mediæval architecture, did perhaps more wickedly than this, for he cased the whole Norman nave of Winchester with work in the style of his own day. Had the "Anti-Scrape" Society been in existence then, William of Wykeham would almost have been hounded out of the country; the *Times* would have been filled with letters about his enormities; no name would have been bad enough for him. The reply to such an instance will probably be, that we have no architectural impulse now, no power of building well. Those who assert this so strongly probably know their own deficiencies, but they might at least be content to speak for themselves. It is certain that this age is not pre-eminently an architectural age, as the thirteenth century was; it is pre-eminently a scientific age; science is its peculiar mission. But that therefore no original architecture worth having is in any way possible, is a rash and somewhat pusillanimous conclusion. At all events, it is quite certain that we shall not produce any by propping up old buildings and watching them with our hands folded; and it might, perhaps, be suggested that if as much trouble and energy were expended in applying the mind to the problems of modern architecture as in mourning over ancient remains, our present condition might be better than it is.

It is, however, equally true that restoration, as it has been recently practised among us, is also a system almost entirely modern and unknown to former epochs of architecture, for the very reason that its opposite, the superstitious veneration of old buildings because they were old, was also unknown. At any period previously to the present century, when a building or a portion of a building was dilapidated, the natural course was to pull it down and to build a new and better one, or what the new builders fully believed to be a better one. The builders of the Mediæval cathedrals appear to have done this with as little hesitation, and as little doubt that they were doing the right thing, as a modern engineer would feel in regard to pulling down an old viaduct or station and replacing it with one more ample and more scientifically constructed; and even the Georgian architects, who placed a Classic pedimented reredos in front of an old Mediæval one, had not the slightest doubt that they were improving the architectural appearance of the building. The result in regard to the Mediæval buildings has been that most of our cathedrals form an agglomeration, highly picturesque and historically significant, of various styles, each portion expressing the taste and artistic power of the generation which built it; and that, on the same principle exactly, Westminster Abbey has been crowded with monuments in a style utterly alien from that of the building, but nevertheless carried out in perfect good faith by the men who designed them, and which the late Dean of Westminster regarded as a most interesting exemplification of the modern spirit in art, "awkwardly struggling into life." We can realise better the distinction between either of the other two methods we are considering, by endeavouring to imagine for a moment what would have been the aspect of our cathedrals if either of the two systems, the restoration system or the let-alone system, had been systematically applied to them, since the Norman foundation (leaving Saxon foundations out of question for the moment). On the restoration system we should now have a considerable number of buildings in the Norman style throughout, a large proportion of which would be probably imitation of Norman work made in the fourteenth or fifteenth century, when the buildings would have begun to require repair, and perhaps further imitation of those imitations made in the eighteenth or nineteenth century. If the let-alone method had been used, we should now have the remains of a set of Norman cathedrals, all genuine work as far as they were left, but with the details nearly obliterated in many places, and the walls upheld by shores, brick piers, and iron bandages, where the foundations had given or the masonry had otherwise failed; and as the Norman buildings were mostly timber-roofed, they would nearly all be roofless. On the whole, the restoration method would have the best of it, as the buildings would at least be available for practical use, which, after all, is one object of a building.

It is this latter fact which seems to be entirely forgotten by the excited opponents of all restoration whatsoever. The mistake which the anti-restoration zealots make is in regarding buildings solely from the point of view of their historical interest. There are, in fact, three different ways of regarding an ancient building, three different values which may attach to it, viz., its historical interest, its architectural beauty, and its practical utility; and it depends upon the relative preponderance of these values in any particular case, which we should adopt of the three possible courses, that of restoration, of removal, or of mere preservation in its existing state. We are speaking, of course, of buildings which have become more or less dilapidated, so that the question is necessarily raised as to what should be done with them. It appears to me that there is only one class of ancient structures to which the doctrine of anti-restoration in its purity can be applied; those, namely, which are already what are usually classed as "ruins," partial remains of structures, all practical usage of which has long been discontinued. These are almost certain to have historical value, and in many cases they have also high artistic value from the remains of beautiful architectural detail which they present. To restore the missing portions of such buildings would only be to add the imitation to the reality, the false to the true; it could add nothing to their value in any way, but rather detract from it: the one thing to do in such a case is to preserve them as carefully as possible, so long as their preservation does not interfere with really serious present interests, which is a possible though a very exceptional case. But the problem is not by any means so simple when we have to deal with a building which is in the main complete, and which is in present practical occupation.

It seems to be necessary to remind people nowadays that architecture is not *only* a form of historical record, but also a form of artistic design; and that the more complete and homogeneous such a design has been originally, the more it will be rendered imperfect by the delay and loss of any of its parts or details. When a building is in that state that a great portion of its mouldings and other details are worn away, I am unable to see why it should be an act of vandalism to replace these by new details following the indications left by the old ones. There need be no pretence made that they are old works; they are simply the repair and reconstruction of features necessary to the architectural expression of the whole, and which had become worn out, although the main portion of the building may be solid enough to last a long time. To say that they cannot have the precise look and surface of the old work, is quite true; why should they? Let them appear as what they are, the necessary restoration of details essential to the architectural ordinance of the building, and which had unavoidably perished in course of time. I would draw a line between purely architectural detail, however, and such additions as figure subjects in sculpture and mosaic. Those are not part of the architectural design, but separate designs added to or framed in the architecture, the value and expression of which depends entirely on the "personal equation," so to speak, of the individual artist. If these are so

far decayed that little or nothing can be made out of them, and that they have ceased to be artistic adornments to the building, let them be, if possible, preserved in a museum, and their places filled up with work of a similar class, not imitative, but representing the best ideas and work of modern artists, unless it be preferred to leave their places vacant. But purely architectural details, which all have a relation to the whole, and are chiefly valuable through that relation, stand on a different footing. Take such an instance as that of a series of traceried windows, of which the greater part of the tracery has decayed, but enough is left to show the original design,—why are such windows to be left melancholy, broken, and dilapidated? To object to their restoration is to be at variance both with architectural fitness and with common sense; to restore them is to restore the originally contemplated architectural design of the whole: and the same reasoning holds good in many similar instances.* Again, there are cases in which the interior of a Mediæval building, let us say, has been utterly spoiled by the insertion of totally incongruous and badly designed accessories, such as the pews, galleries, and Classic reredoses of what may be called the "churchwarden era." When the ecclesiological movement began, there was a greatly-exaggerated depreciation of everything that was not Mediæval, and all relics of the "Pagan" Renaissance were to be trampled under foot. This, of course, was absurd. But equally absurd is the new idea, that all the preposterous lumber that may have been put into a church is to be left there for ever, because it was once ignorantly put there. A good Mediæval building is an illustration of a special architectural style consistently carried out. Even good work in the Renaissance style is at variance with the artistic feeling of a Gothic building, and had much better be removed, if a good and more suitable use can be found for it elsewhere. But the feeling of the modern zealot does not stop at what is good. He would have us religiously retain an ugly and unnecessary gallery, a hideous quasi-Classic reredos, which are absolute blots on the main architectural design of the building, because some blockheads put them there a century ago. Had the said zealot and his Society been in existence then, they must, on their own principles, have protested vehemently against these additions to the building as acts of vandalism. If any one will give me any logical reason why an addition, which was vulgar and tasteless when it was made, should become an object of enthusiasm because it has been there for a hundred years, I shall be very glad to hear it.

This latter point is partly connected also with the practical view of the subject, as regards buildings which are in present occupation. That our cathedrals and churches are buildings in present occupation is a fact which seems by some people to be entirely forgotten. If it is to be laid down that those using the churches are never to repair or re-furnish them, never to clean away whitewash and cobwebs, or to lay down a new tiled floor, I suppose the same argument applies to old houses, and that the man who has the misfortune to live in an old Elizabethan house has no right to have his rooms repainted or re-decorated, or to have any new furniture of any kind, on pain of æsthetic damnation. If it be true that cleanliness is very closely connected with godliness, it might be supposed that even on that ground it was on the whole a pious work to clean and scrape and redecorate the interior of a church or a cathedral occasionally. To my perhaps perverted mind it seems that even architectural effect is aided by an aspect of cleanliness and renewal of interiors at least. I have read in the æsthetic papers lamentable outcries over the spoliation of Tewkesbury Abbey by restoration. I first saw Tewkesbury when the interior restoration was half finished, down to the first bay of the nave, and a screen divided the restored from the unrestored part. There was some coarse and glaring gilding introduced on the bosses of the vaulting, the effect of which was vulgar and over-prominent; but with that exception, the restoration chiefly consisted in scraping off whitewash dingy with the dirt of years, and cleaning the whole thing up generally. On the western side of the screen were dirt, whitewash, and general untidiness, on the eastern side cleanliness and order and repair; and if any one had seriously told me that the architectural effect of the restored portion had been injured by the change, I should have regarded him as a person too silly to be worth arguing with.

In connexion with the practical part of the subject comes the question of the stability of an edifice which is in use. Upon this head the scepticism of the new æsthetic party is most remarkable. No representations will induce them to believe that a building is really too rickety and dilapidated to do any good with. It is all the malice of the architect, who wants to have a commission to build a new one. It is desirable that the general public should be decisively warned against believing all the assertions which are made in such cases, often by people who have absolutely no means of judging of the truth at all. Let me put on record one example about which I happen to know something. There was a furious paper warfare some time since about the proposal to put a new roof on the nave of St. Alban's Abbey. The proposal was denounced by members of the anti-restoration party, who had never seen the roof for themselves, as absolutely scandalous; they had been assured on good authority that it was perfectly possible to repair the existing roof, &c. I was one of those who did see the said roof, which was in such a condition that the wonder was that it had clung there so long, and that it had not been down in the church long before. Then there was a solemn appeal made in one of the papers (the *Athenæum*, I think) about the painted ceiling of the nave, or rather an expression of incredulity that any one could dream of touching *that*, as if it were a sort of sacred thing. Now there is one portion of painted ceiling at St. Alban's which is good and original Mediæval work; but the ceiling of the nave aforesaid was what appeared to be a bad and rough imitation of the general effect of the older part; it was a design of the most commonplace character, such as an architect's pupil might make the first time he got a pair of compasses and a paint-box in his hand, and it was roughly painted in black and red on wood little thicker than a band-box, and so rotten that you could almost crumble it in your fingers. And I think any one who had first read the outcry in the papers about this roof, and then gone up the ladders and looked at it, would have made the same memorandum that I did, not to believe everything that he was told about the stupidity and vandalism of restoring architects.* The latter have, no doubt, done some things they should not have done; but I venture to think that in nine cases out of ten they know better what they are about in these matters, and can better judge how to reconcile the claims of archæology with those of practical architecture, than their very pertinacious instructors of the anti-restoration clique can teach them.

This very strong and exaggerated feeling about touching ancient buildings, even in the way of reasonable repair and refurnishing, which has made itself heard lately, is only one form of a prevalent false note in the life of to-day, consisting in a disbelief in and discontent with everything in the present, a continual sentimental yearning over the life of the past, or after some impossible æsthetic millennium of the future. Nothing done to-day is good; everything good was done a long time ago; and, conversely, everything that was done a long time ago was good. This unwholesome sentimentalism has affected the judgment of many persons in regard to all the artistic side of life, as well as in regard to social conditions; and one form which it takes is this exaggerated worship of old buildings, quite irrespective of the merits or defects which a calm critical judgment might see in them; the natural conclusion from which state of mind is, that there is no limit whatever to conservatism in regard to ancient buildings; that, however dilapidated, however useless to us at present, however really bad in style they are, they must be preserved till they come down of themselves, because they are relics of the past, and we poor creatures of the present can do nothing. It is vandalism even to decorate an old building in any way; and one eminent decorative artist lately made public his determination to put no more stained glass into any old building. One cannot but respect the heart of an artist so conscientiously sticking to his principles in opposition to his own professional advantage; but this must surely be at the expense of our respect for his head. Another characteristic of this superstitious worship of old buildings is that it puts aside all questions of public convenience or public improvement, all questions of mere utility in fact, as trivial and beside the mark. Thus the outcry about the removal of one or two of the City churches in London has been more serious than the nature of the cases really warranted. It is out of the question that churches which, owing to various social changes in the locality, have fallen almost out of use, should necessarily all stand for ever, where land is so much wanted for the immediate purposes of life, because they were once put there; especially when their architectural merits are certainly in some respects over-rated. For it is one result of this over-acted conservatism that all critical judgment is subordinated to an uncritical, and what may be called a sweeping admiration for the past; otherwise it would surely be seen that Wren's churches, even where they are admirable for their plan and construction and a general largeness of style, are so in spite of much exceedingly bad and even vulgar detail. The absurdities to which this kind of superstition may lead people are notably exemplified in the statement which has been solemnly made, that the undulation in the pavement of St. Mark's at Venice was intentionally made by the builders, and constitutes one of the special beauties of the edifice. Persons who would say that would probably say anything. But those who are not entangled in this kind of sentimentalism will regard architecture as an interest of the present quite as much as of the past, and as a subject which has its practical as well as its sentimental side. They will recognise that those who are officially or professionally in charge of ancient buildings have something else to do than prop them up and watch them crumble away; that it is worth while to keep the architectural design of a building intact by occasional renovation of its details before they are worn out of all recognition; that it is no artistic desecration to clean and redecorate a building once in a century; and that where a building is actually in occupation or usage, to neglect or refuse to do this would simply be to range ourselves on the side of slovenliness, dirt, and decay, besides the evil of deliberately shutting out one means of stimulating and encouraging the artistic design and art workmanship of our own day. That is one merit which has certainly to be credited to the Gothic revival and the restorationists. They sometimes overdid restoration deplorably, and made some great mistakes which cannot now be unmade; but they did a great deal to stimulate architectural study, and to give a new life to architectural art in this country. The Gothic revival and the restoration movement constituted a kind of "craze," no doubt, and did mischief in some ways, while doing good in other ways; but the anti-restoration craze does neither evil nor good; it would avoid mistakes by doing nothing; it means architectural stagnation and death.

A Cathedral for the Isle of Man.—A meeting for the purpose of promoting the erection of a cathedral in the Isle of Man was held at Peel on the 20th inst. Bishop Hill presided. A scheme was produced for making the new parish church of Peel, now nearly complete, into a cathedral. This could be done at a cost of 2,000*l.*, but the scheme was opposed on the ground that the cathedral, to be of utility, should be established in Douglas, that being the centre of the population, and the chief resort of many thousands of visitors to the island. If, however, Douglas was chosen as the site of the proposed cathedral, the cost would not be much less than 50,000*l.* An amendment was proposed by Mr. E. C. Farrant, that an architect should be employed to report on the cost of so altering one of the existing churches in Douglas as to make it suitable for the purposes of a cathedral. This amendment was not seconded, but the bishop expressed himself in favour of a new cathedral in Douglas, if some means could be devised for raising the necessary funds

* Since this was written, I have met with some remarks in a paper in the August number of the *Cornhill Magazine*, by the talented lady who writes under the name of "Vernon Lee," in respect to the restoration of ancient statues, which bear upon and support this view. Speaking of the case of a beautiful head of which the nose was gone, she asks whether any modern restoration of the feature could possibly be so injurious to the statue as this ghastly scar in the centre of the countenance. The same argument applies to what we may call the architectural countenance of a building.

* This must not be taken to imply any sort of satisfaction with the treatment which St. Alban's is now undergoing,—not, be it observed, at the hands of an architect.

AN INTERNATIONAL DEBATE ON DRAINAGE.

THERE were no fewer than fifty-one subjects inscribed for discussion by the five sections of the International Sanitary Congress.* But of all these questions, that which attracted the most attention, elicited the greatest number of speeches, the strongest display of feeling, was the problem of dealing with the sewage of towns. The authorities of Geneva are themselves somewhat perplexed by complications in this respect that become more and more serious every day as the population and number of visitors increase. Several town architects and engineers, therefore, took an active part in the discussion, and though the section had no less than nine subjects to debate, it devoted three out of its four sittings to this one topic. The debate was opened by M. A. Durand-Claye, chief engineer of the Paris Ponts et Chaussées, professor at the École des Ponts et Chaussées and at the École des Beaux-Arts. As one of the principal authors of the irrigation farm at Gennevillier, M. Durand-Claye's eloquent and witty speech was devoted to the defence first of draining into sewers, and then of disposing of the sewage by irrigation through cultivated fields. Cesspools he justly qualified as barbaric contrivances, and proclaimed himself the uncompromising advocate of what is known in France as the principle of "*tout à l'égoût*." The arguments in favour of this principle are so familiar in England that we need not repeat them. The real points at issue were what should be done with the sewage when collected, whether there should be a separate sewer for rain and surface water and another for sewage proper, and whether the latter should empty itself by the force of waterflow and gravitation, or by pneumatic suction.

Dr. P. Brouardel, from Paris, Professor of Forensic Medicine, delivered an earnest protest against the dangers of draining into sewers. He described the visits he had paid to the Paris sewers; how in the sewer of the Rue Montmartre he found the deposit of filth more than a foot deep, and how in this mud he had disinterred dead dogs, &c. If to such foul accumulations were added the germs of disease, an epidemic must inevitably break out. It was all a question of the germs, and in large towns the germs must sooner or later find their way to the sewer; and sewers, working so badly, apt to stagnate and collect filth, were well suited to develope the germs and spread the disease. Typhoid fever had undoubtedly been traced over and over again to the sewers, and the present epidemic in Paris was in all probability due to that same cause. During the sieges of Metz and of Paris in 1870, every condition known to favour an outbreak of typhus existed, and yet this dreaded disease did not make its appearance. At Metz, the case was more remarkable than at Paris, because there were soldiers ill of typhus fever among the Germans. Fortunately the French made no prisoners; the germs were, therefore, not introduced into the besieged city, and hence, in spite of all the predisposing circumstances, this fever did not attack the inhabitants. So in Paris, and in every large town, there were thousands of persons who, from time to time, became predisposed to certain diseases, yet these persons escape the illness if they have the good fortune not to come in contact with its specific germ. Dr. Brouardel's experience of Paris sewers, however, led him to believe that they would bring the germs to the door of every house. He therefore hesitated before approving the abolition of cesspools and the mingling in the public sewer of the dejections from every household. If, nevertheless, this was done, then the sewage should be received in pipes hermetically closed with no possibility of any sewer-gas escaping either into the street or the houses. In other words, Dr. Brouardel was evidently an advocate of the pneumatic system of drainage.

M. Émile Trélat, the eminent architect, whose name is already familiar to the English reader, at once rose to oppose the conclusion of Dr. Brouardel. He protested that the matter had now become no longer a question for doctors to decide, but for engineers and architects to debate. The doctor was no longer the operator; he now occupied the position of the patient. It had been decreed by doctors, chemists, and men of science generally, that all organic matter must be at once removed from the neighbourhood of dwellings; that if such matter remained stationary even for a few hours it might endanger public health. In a word, removal before mischief has time to arise was the solution of the problem. It was a doctor's business to arrive at this conclusion, but, in the carrying out of this principle, he was no longer a competent judge. He compared Dr. Brouardel's language to that of a patient before an operation, who insisted on examining the surgeon's instruments, criticised his mode of proceeding, and complained that he might perhaps hurt him. M. Trélat was well aware of the imperfections in the Paris sewers, but this only proved that the sewers had been badly built and must be rebuilt. In Paris matter coming from the farthest branch of the sewers should not take more than six hours to reach the outfall; and in answer to the danger of typhoid fever from sewers he would quote the statistics given at Berlin during the recent epidemic. In 1879 there was one case of typhoid fever in every sixty-five houses draining into the sewers, and one case in every seventeen houses draining into cesspools. In 1880 there was one case of typhoid in every forty-five houses connected with the sewers, and one case in every nine houses not connected.

Dr. J. Teissier was the next speaker, and he gave the details of a most interesting experiment he had made at Lyons, where cesspools are still used by most of the inhabitants. The hospital of the Charité, however, drains entirely into the sewer. In spite of this the scavengers of Lyons always prefer descending into all the parts of the sewer communicating with the hospital. They declare it is free from bad odours, and the easiest to clean. Dr. Teissier, collecting some water in this sewer, found it so clear and free from odour that any one ignoring whence it came would not have hesitated to drink it. He then proceeded to inoculate some guinea-pigs with a strong solution from a cesspool. The animals were none the worse after the operation; but the guinea-pigs inoculated with the clear water from the Charité hospital sewer died in seventy hours. Dr. Arnould, who assisted at these experiments, found microbes in all the tissues of the dead guinea-pigs; and by inoculating other guinea-pigs with the blood of the first victims, the poison in passing through various guinea-pigs became so intensified that ultimately death resulted in ten hours. The apparent cleanliness of sewer water was not, therefore, a proof of its purity. Yet he recognised that the sewer water of towns where cesspools were still maintained, contained nearly as much nitrogen as those which received the entire drainage. He also recognised the experiments made by Doctors Simon and Emmerick, which proved that human dejections, diluted and injected into animals, would not harm them if fresh, but that the same solution, even when administered in a smaller dose, would produce death if allowed to stand for a few hours. He therefore could not deny the importance of the immediate removal of sewage. But while sewage, if promptly removed, could not, as a rule, be injurious, and would not create germs of disease till it had had time to ferment, still, if it should be impregnated from the very first by specific germs coming direct from patients, he thought that no amount of cleanliness and freedom from odour could disguise the fact that, at such moments, sewers were dangerous, and carried the danger far and wide.

Dr. Vidal then followed with some remarks as to the risk of sewers communicating with the outer air, and related how an epidemic had broken out at Croydon by the accidental contamination of the water main with sewage.

This speech, and it was a lengthy one, ended the first day's debate, which imparted a general impression that whatever was done would be badly done, and that the building of sewers in particular was fraught with incalculable danger.

M. Duverdy opened the next day's debate by protesting that too much had been said concerning the dangers of sewers, and nothing about the disposal of sewage. He was willing to recognise that the experiments at Paris and Berlin proved the possibility of rapid transit of matter in the sewers; but the first of all questions was to settle what would be done with the water thus transported. He then proceeded to give a vivid account of the sewage farms near Berlin, describing them as sloughs of despond, where cattle could not graze, but sank up to their knees in mud. The farms were not nearly big enough. For the 300,000 inhabitants of Berlin, no less than 2,017 hectares of farm land would be required. In Paris, with its 240,000 cesspools, 14,000 to 15,000 hectares would barely suffice if all the sewage was to be thrown on to the land.

Dr. G. Varrantrapp, the medical officer of health at Frankfort, then delivered so thoughtful and practical a speech that we are tempted to translate almost verbally the greater portions of this discourse, which, in fact, was received with the utmost attention and applause. The learned doctor urged that local observations, however accurate and authoritative, did not justify our adopting general conclusions. The sewage question was a question of principle. It had become an international question, and must not, therefore, be lowered to the level of a mere parish squabble. The results attained at Paris certainly presented great interest to us all. But the experience acquired at Paris does not touch the question. "I am very willing to allow, for the moment, the imperfections of the Paris sewers,—imperfections that are the more easy to understand, as the town attempted to unite old with new sewers. If there is stagnation,—if there are deposits in the Paris sewers, this is highly regrettable, but it does not prove that these defects are inherent faults of the system of sewers. The question is, whether it is possible to construct sewers where these deposits will not occur? For my part, I confidently affirm that it is possible. I will not speak of the experiments made at Hamburg, Dantzig, and Berlin, where I have visited the sewers, and found no deposits or stagnation, but I will speak of Frankfort, where my observations have been made from day to day. We have real sewers, that is, sewers receiving everything that comes from the houses. These sewers were commenced fifteen years ago, and have now reached a length of 130 kilomètres, fed by 25,000 water-closets, which householders are now compelled to use. Never during these fifteen years, excepting at the period of construction, has it been necessary for a workman to descend into these sewers with a broom or any other implement for the purpose of cleansing. The cleanliness is maintained by the household water, of which 15,000 to 18,000 cubic mètres are daily employed. So great is this incidental flushing of the sewers that a special discharge of water direct into the sewers is rarely if ever required. Yet, in spite of this, there have never been any deposits, either in the little or the big sewers, though the main sewer has only a fall of 1 in 2,000. He challenged the members of the congress to come to Frankfort at any time they chose and to descend any part of the sewers they might select, and he defied them to find any deposits or stagnation. They would further find that the sewers were free from odour, or, at least, they would not be able to detect the odour of human dejections. The water travelled from the farthest water-closet to the sewer outfall in about one hour and a half. Frankfort deems that she has proved the possibility of constructing effective sewers. I will now examine the statistics, which are so often misquoted, that accurate figures lead to inaccurate conclusions. Our statistics since 1850 are very precise in their character. During the first period of five years we had eighty-five deaths from typhoid fever for every 100,000 inhabitants per annum. Then the figure decreases from 1866 to 1868 to 6·1, 1869 to 1871, 7·9. Thus showing an increase after the construction of the sewers, but when, in 1875, the water supply which formerly had been insufficient was added, the figure fell to 2·8 from 1875 to 1877, and to 2·0 from 1878 to 1880. Let these figures be compared with those of Paris, where typhoid fever has increased tenfold within the last few years! This good result is not due entirely, but in part, at least, to the Frankfort sewers. We must remember that modern typhoid fever cannot be compared with the typhoid of thirty years ago. Throughout Europe it has decreased, but other maladies, such as diphtheria, have increased. At Berlin we can establish a comparison between houses that are connected and those that are not connected with the sewers. During the last few years the progress of canalisation has been very rapid, with the effect of reducing the mortality from typhoid fever in the houses connected with the sewer to the extent of one-third; while in the house not connected no reduction whatsoever has taken

* See pp. 349, 364, 394, *ante*.

place. The experience acquired at Hamburg and Dantzig points to the same conclusions. An outbreak of typhoid occurred in this last town ten years after the building of the sewers, but this was due to a defect in the construction and the insufficient ventilation of the sewers. This is no more a reason for condemning sewers than an accidental gas explosion would be for condemning the use of gas. At Croydon faults of construction once remedied reduced the mortality to about the lowest in Europe, that is, from 11 to 15 per 1,000. Eminent doctors at Glasgow and elsewhere believe that by increasing the number of water-closets the number of cases of diphtheria also increases. But we must not look at the details of a few houses. The question must be judged on a broader basis. The Registrar's return for Scotland shows that during recent years deaths from diphtheria in rural districts have been more frequent than in towns, and yet the cottages in villages have neither water-closets nor sewers. Throughout Prussia diphtheria is more prevalent among the rural populations. But here is another example. From 1862 to 1866 there were about 10,000 deaths per annum from diphtheria in England, but in 1870 to 1880 there were only 3,000 to 4,000 (?). Have the number of water-closets and of sewers been reduced during that period? The Governments of Podolia and Ukrania in Russia had about three times as many deaths from this cause as England; but, how many miles of sewers are there in England as compared to Podolia? Let us be prudent in coming to general conclusions after a partial study of figures." Finally, it had been remarked that it was only the human *dejecta* that poisoned the sewers when these began to ferment. Do not kitchen-waters ferment? Does not kitchen-water give a more offensive odour than that of water-closets? Other speakers wished to divide the waters. Do they not know that Pettenkoffer and many other able chemists have demonstrated that there is no difference in these waters? If we tried to separate the waters what would become of the morbid dejections of the 80,000 or more houses that crowded the streets of the great capital. Then the linen coming from a patient, and which often contained the most dangerous of all matter, has to be washed, and the water would go into the ordinary and not the special sewer. Such questions required serious and comprehensive study, and the conclusion would be that everything should go to the sewer, but above all that there should be no stint of water.

Following on Dr. Varrantrapp, one of the few English speakers insisted on the necessity of ventilation of sewers and disconnexion between house and public drains, and denounced in no measured terms the barbaric condition of French towns.

Dr. Overbeek de Měyer, Professor of Hygiene at the Utrecht University, found that M. Durand-Claye had committed many errors. To begin with, he spoke principally of the Paris sewers. Now, this was the very worst example he could give us. There were three means of applying the English system,—the first was what we saw at Paris, large sewers with domed roof and side sewers opening without valve or any impediment on to the large sewers, and communicating with the houses by pipes that were not trapped. These sewers received a large quantity of organic matter and greasy matter that stuck to the sides and refused to float away. Deposits were the natural consequence, and these remained bare when the falling of the water level after rain disclosed what adhered to the sides. An army of sewer men, more than 800 in Paris, were required to scrape these sides of the sewers. Now, this form of sewer is condemned by all competent men living outside Paris. Mr. Rawlinson, the eminent sewer engineer in England, has declared that if the sewers of Paris had to be made over again it would be necessary to adopt another system. It would effectively have been more logical not to have allowed all the solid matter to enter the sewers when it was so difficult to get rid of it that it had literally to be pushed along by men till it reached the outfall. The second application of the English system is best illustrated by the town of Frankfort. For there main sewers have been constructed under Dr. Varrantrapp and Mr. Lindley, with every possible care; the sections not being too large, with syphons to protect each house and each branch drain. By means of powerful flushing at regular intervals, cleanliness is well maintained, and he was obliged to confess that he could not find any deposits when he visited these sewers. Yet the system is not perfect, for the ventilation of these sewers carried germs, perhaps above the roofs of the houses, but the currents of air could bring them down again into the street, especially where the houses are not all built on the same level. One of the speakers stated that sewer gas always went to the highest point. This is a mistake. M. Rozsahegyi has shown that this was not always so; the course taken by the air must depend on barometric pressure, &c. He further doubted the water-tight properties of the Frankfort sewers. Accidental fissures must occur, and these are very large in the Paris sewers, at least according to the official reports. Thirdly, we have the English sewer applied by means of a separate system. This means one sewer for house and closet water, and another for rain or surface water. In the former, flushing by automatic syphons is established. The separate system, qualified as tolerable where nothing better can be had by M. Durand-Claye, is, on the contrary, the best of all systems. It is advocated by the most eminent English and American engineers. Mr. Robert Rawlinson would like to apply it to the towns of London and Paris, and it is now actually working admirably in the towns of Penzance, Carlisle, Dover, Chelmsford, Ely, Rugby, Reading, Oxford, and in America at Lennox, Cumberland Mills, and Memphis. The statistics quoted often showed an improvement, but this was due frequently to improved water supply rather than the building of sewers. Thus at Croydon, during the epidemic of 1875 (April and October), 950 cases of typhoid and 87 deaths occurred in 10,456 houses with water-closets, while only nine cases and three deaths occurred in 1,070 houses without water-closets. Alluding to the Liernur system, he remarked that it admitted the use of five litres per head per day in the closets, while M. Alphand demanded for Paris only three litres. He was aware that the Paris engineers demanded more (M. Durand-Claye, "40 litres"), but evidently this was not required for the sole purpose of cleanliness. This quantity was not necessary for cleanliness, but as a motive power to push heavy substances along in the sewers. But M. Liernur did not demand any such help, for he produced a vacuum in his pneumatic sewers. If foul matter did get into the other sewers it would be an exception, and, as such, would not stagnate. The municipality of Amsterdam had answered to the inquiries of the Prague municipality that (1) the Liernur system, tried for eleven years, had worked thoroughly well; (2) cost but little, and paid good interest; (3) the metal pipes remained absolutely water-tight. The rare impediments were caused by abuses, never by any fault in the system, and were easily removed; (4) the estimates of Captain Liernur deserve every confidence, the expenses being, if anything, over-estimated; (5) the system is superior to all systems known from the hygienic, financial, æsthetic, and technical point of view.

Dr. Loiseau, member of the Paris Municipal Council, then delivered a lengthy speech, aimed at his electors rather than at the members of the congress. It was difficult to discern what the honourable councillor's opinions might be, but he admitted the necessity of water, the danger of germs, the success of the irrigation farm at Gennevillier; in a word, he recalled the typical reply of M. Prudhomme on being presented with a sword of honour,—"This sword is the happiest day of my life; I will use it to defend our Government and national institutions, and, if needs be, to combat them."

During the third day's debate on these questions of sewage, the speakers from Geneva took a leading part. M. Armourdier, town contractor, explained how Geneva was drained and the drains flushed, from which it appeared that a sort of receptacle placed where the cesspool used to be, and where all the house-drains united, was periodically flushed from the water main, which was placed within the sewer, and communicated directly with the branch sewers or house-drains, and with the taps whence was drawn the drinking-water! On objections being raised by the English present, the only answer was the old argument that the pressure of water prevented the sewer-gas entering the water-main.

Another speaker insisted on the necessity of maintaining the water at the same level in the sewers. At Rheims, 30,000 cubic mètres of water passed through the sewers in twenty-four hours,—28,000 cubic mètres during the day time, when all the wool-carding factories were at work, and only 2,000 cubic mètres at night. As a natural result there were horrible smells at night. This, indeed, explained the prevalence of smells, so general at night in towns. Under such circumstances sewers were always dangerous, however well they might be constructed. The great problem was how to maintain the water level always at the same height in sewers.

Dr. C. W. Covernton, member of the Ontario Board of Health, described the measures taken by the public authorities in Canada, the appointment of Government engineers to see that drains were properly laid, trapped, and ventilated to the top of the houses, and various other eminently practical efforts that redounded to the honour of the Canadian sanitary administrators.

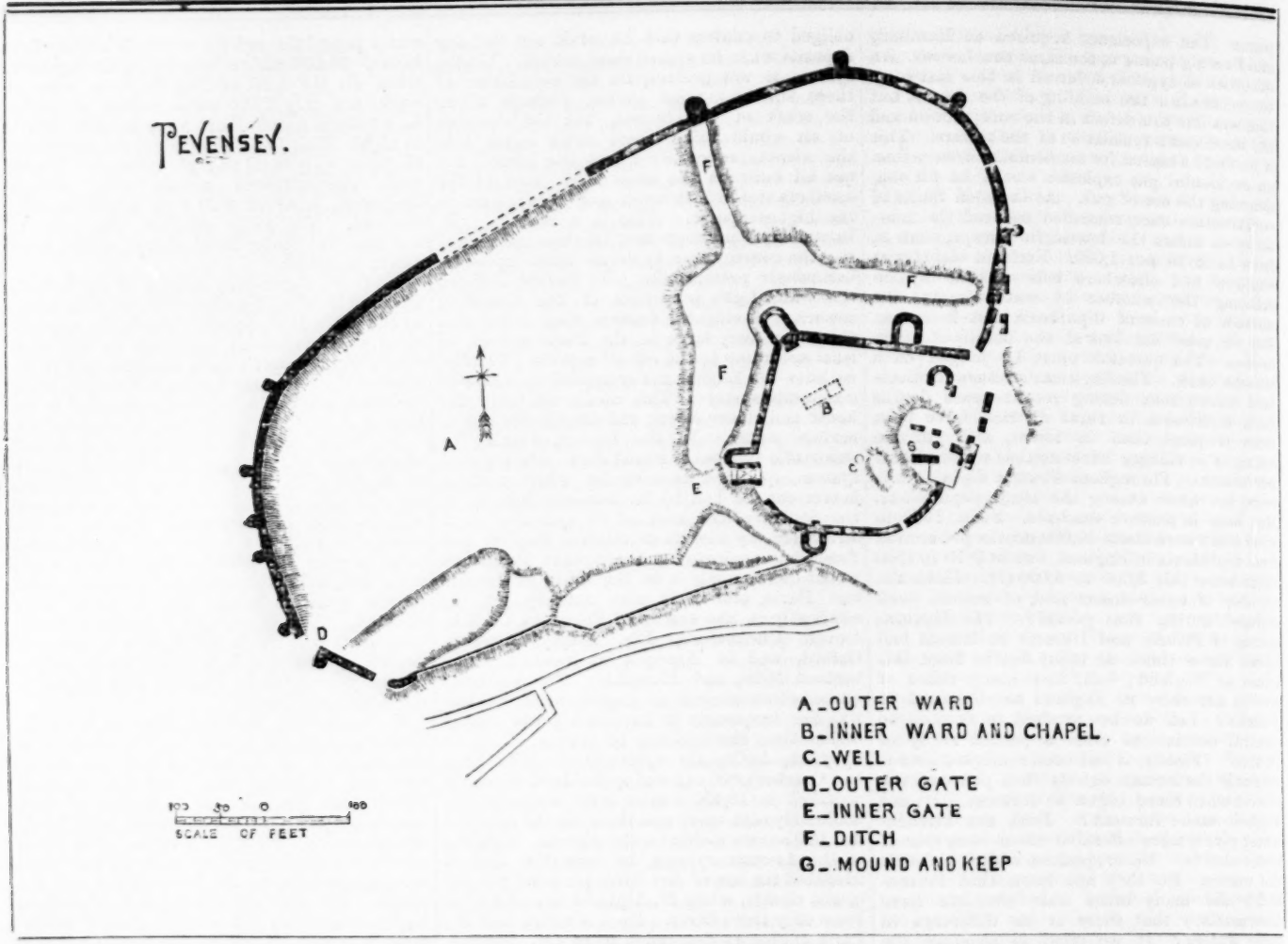
Dr. Hauser, of Seville, followed, and presented an elaborate and most carefully-calculated work on Seville, with maps, showing the death-rate for each quarter of the town, and, as compared with the state of the sewers. This led to the conclusion that the lowest and best-drained districts were the most healthy. The patients in the hospitals contracted the diseases special to the quarters where the hospitals were situated. Altogether, this remarkable study, too replete with facts and figures to bear condensation, concluded in favour of the principles generally accepted in England with respect to the draining of houses.

M. H. Bourrit, architect, Geneva, then delivered an optimist speech on the condition of Geneva, in which he boasted that the sewers were not ventilated at all, and that no complaints were possible. As a matter of fact, complaints are possible, and were very freely uttered during our stay in Geneva. The sewer mouths are all trapped by syphons, and there are syphons between the house-drains and the sewers. The confined sewer-gas is, therefore, highly dangerous; and when, in spite of water-seals, it makes its escape, the results are anything but pleasant or safe. Also, when we think that it is in these unventilated sewers that the drinking-water is conveyed, the prospect that an accident to the pipes suggests is anything but pleasant. Still, M. Bourrit and the other speakers of Geneva seemed quite satisfied with the present state of affairs, and their only anxiety was to know whether or not they should create a sewage-farm or continue throwing all the sewage into the Rhone.

At last, this long debate was brought to a close by M. Durand-Claye, who very adroitly pointed out that all opponents to the "*tout à l'égoût*" principle came from towns where it was not practised, but that no one from the numerous English, German, and American towns, where everything went to the sewer, had come forward to advocate a return to the cesspools as of old. The great point he urged was water. No system was perfect that did not allow the poorest person to deluge his family with water. Movement, movement of water as of air, was the only means of cleansing our sewers as of ventilating our rooms. The man who wants to be clean washes himself; we must wash our sewers, not so much by direct flushing, as by great volumes of water going through the houses first. M. Durand-Claye further defended the large-sized sewer on the ground that in it the water met with less friction and therefore ran quicker. Finally, he invited all the members of the congress to visit the sewage farms at Gennevillier.

Altogether, it seemed pretty evident that the majority were in favour of allowing everything to go to the sewer, but opinions were much divided as to the advantages of the Liernur and Berliez systems of pneumatic drainage and the ordinary process. The German, Dutch, and English speakers alone seemed acquainted with the practical problems involved in the question of trapping and ventilating sewers and house-drains; and to Englishmen the debate seemed confined too much to general principles, and did not deal sufficiently with those details of application which, if neglected, compromise the best of theories.

The Baroness Burdett Coutts has acceded to the invitation of Mr. W. Busbridge to deliver the Queen's prizes to the students of the Metropolitan Drawing Classes. The ceremony will take place at the Guildhall, on Thursday, October 12th. The Lord Mayor will take the chair at eight o'clock.



PEVENSEY CASTLE.

PEVENSEY is, in some respects, the most interesting place in the South of England. Not only is it closely associated with English history during the eleventh and twelfth centuries, but its ancient and present names, and a part of its material remains in masonry and earthworks, connect it closely with the British, Roman, and early English occupation of our island.

It was, without doubt, the chief place in the great forest of Anderida, which, in remote times, extended over the south of Sussex and the Weald of Kent, and of which the not infrequent remains are seen in the very numerous and wild parks found in these districts. The British name, both of forest and town, is preserved in its Roman form, and the site of the latter is still indicated by its Roman walls and towers, which compare with those of Porchester in extent and completeness, and, like them, have been incorporated into a later fortress. The Romans probably left Anderida in good repair. One of the chief strongholds of the "Comes littoris Saxonici" was not likely to have been neglected, and it appears, from the Saxon Chronicle, that the Britons were well aware of its value, and held it against their piratical invaders with fierce but unavailing valour. Late in the fifth century it was besieged and taken by Ælle and Cissa and their followers, and every Briton within it was put to the sword. Possibly to this period are due the marks of undermining still to be seen along the exterior base of the Roman walls, and to some period between the original construction of the wall and additions by the Normans are to be referred the slips of the soil by which the foundations have been weakened, so that the wall, unsupported, has given way along the south front.

Andredes-ceaster or Andreceaster, from a Roman and British, became an English fortress, and, by slow degrees, the Forest of Andredes-weald became encroached upon by cultivation. The change of masters also brought a change of name, and the island or "eye" in the marsh became the property of a supposed "Peofn," whence its present name is thought to be derived.

Under the English rule, law and order and the divisions and names denoting property were gradually introduced, and Pevensey became the chief town of a Rape, an honour it shared with Chichester, Arundel, Bramber, Hastings, and Lewes, in each of which the town was distinguished by early earthworks, and at Chichester by Roman walls. Each of these Rapes, divisions thought to be of Jutish origin, had its town and fortress, and each town was placed upon a river. That of Pevensey rises in the wooded ridge about Penshurst and Dallington by a number of streamlets which meander athwart the marshy level of Pevensey, until a little above the castle they form what is still known as the old Haven, and which was in use in the twelfth century. As late as 1317 a grant by Edward II. mentions the marshes as overflowed by the sea, and as in no man's tenure. The castle then stood on the margin of the sea, from which it is now more than a mile distant, and the whole area of the level, many square miles in extent, seems to have been an impracticable morass, covering the fortress towards the south and east, and in some degree to the north. The knoll must so have presented itself to Julius Cæsar, if, as generally supposed, he here landed, and so, with the addition of the Roman walls, it was certainly seen by Ælle and his followers, and 500 years later by Duke William when he landed between Eastbourne and Hastings, and selected the higher ground to the east of that castle for his march inland to give battle. "Mare transivit," says the Bayeux tapestry, "et venit ad Pevensae," and the chronicle of Battle says he landed "prope castrum Pevensel dictum," whence the soldiery went to seek victuals at Hastings. Here, then, it was, beneath these very walls, that the Conqueror took seizin of his yet unconquered kingdom.

Pevensey, under the Normans, became once more a place of consequence, and one of the havens through which the sovereigns kept up their communications with Normandy. It was hence that the king embarked on his return to Normandy in 1067. William granted it to his half-brother of Moretaine, who is said to have built a castle there. What he actually built is unknown, and the only existing masonry that can possibly be of his date is the broken superstructure of one, or perhaps two, Roman towers, and some rude repairs executed on the face of one of them. But whatever he did he held, and continued to hold the Roman castle till his death, and he so held it against William Rufus, in 1088, being supported and encouraged by Bishop Odo of Bayeux, and by the hope that Duke Robert would come to their relief from beyond the sea. This hope was fallacious. Rufus having stormed the mound of Tonbridge, laid siege to Pevensey. The garrison was brave, the Earl Bishop and his brother Count were skilful generals, the walls were high and strong, and for six weeks the king, at the head of a numerous army, assailed the place in vain. A tardy force sent, not led, by Duke Robert, strove to land beneath the castle wall, but, though the king's English soldiers were thus placed between the double attack from the castle and the ships, they overcame and, for the most part, slew the invaders. The castle was surrendered, and Odo, transmitted under a guard to Rochester, contrived to enter that castle, and to encourage its garrison to hold out.

Pevensey next comes under notice in 1101 as the muster place of the army led by Henry I., to repel this expected invasion of Duke Robert. He was so far successful that the invaders were driven to land at Porchester. Either under Earl William of Moretaine, who was taken at Tenchbrai and lost his lands, or under his successor, Gilbert de L'Aigle, the Lewy of Pevensey was erected into an Honour, and finally became the Honour of the Eagle, "Honor de Aquila." In 1144 the castle was attacked by Stephen, and defended by Gilbert de Clare, then holding it for the Empress, to whose son Henry it had been granted by Henry I. It next came to King Stephen, and about 1216 became the property, under the Crown, of William de Warren, and after various confiscations and restorations, was finally lost to the De Aquila family in the reign of Henry III. John, Earl Warren, took refuge here in 1264, after the Mise of Lewes, and in the following year it was held by Peter of Savoy for the king against the younger De Montfort. Very little of the present Mediæval masonry could have been standing during these various sieges. The strength of the place must have then mainly depended upon the Roman

exterior wall, furnished, no doubt, with a Mediæval parapet, and dominated by the early English mound, with probably a shell keep, of timber or masonry, upon it.

About 1269 it fell into the hands of Prince Edward, and remained a while in the Crown. In 1309 it was in a ruinous condition, "Confractum et male custoditum," Edward I. having declined to repair it. It must have been soon after this, judging from the evidence of the existing masonry, that the present additions were made, that is, either at the close of the thirteenth or very early in the fourteenth century. The towers are attributed to Edward II., in 1309.

Pevensey, "La Ville et la Lewee de Peuense," was included in the extensive grants made by Edward III. to John of Gaunt, under whom and the Duchy of Lancaster the Pelhams became hereditary constables. In 1399 Lady Pelham distinguished herself by holding the castle for Richard II. against the combined *posse* of the counties of Kent, Sussex, and Surrey. After this event it was mainly used as a state prison. Edmund, Duke of York, was confined here in 1405, and in his will bears testimony to his good treatment; and here also were imprisoned James I. of Scotland in 1414, and in 1419 Joan of Navarre, the last queen of Henry IV. In 1650 the castle had a narrow escape from the claws of the Parliament, the materials having been sold for building purposes.

The history of the building, though aided by passages in the public records, is mainly to be established by the study of the material remains. Those of the Roman period have fallen under the searching and very accurate notice of Mr. Roach Smith; the present paper deals mainly with the Mediæval additions both in earthworks and masonry.

DESCRIPTION.

The Roman fortress is in plan a rounded oblong, 220 yards north-east and south-west by 115 yards, and contains from 8½ to 9 acres. It is included within a wall strengthened by towers, and here, as at Lyme, the outline of the plan was evidently governed by that of the ground on which the castle stands, and which rises 8 ft. to 10 ft. above the sea level and that of the surrounding marsh or meadow. The wall is from 10 ft. to 11 ft. thick throughout, and at this time from 20 ft. to 30 ft. high. The length in circuit is about 580 yards. At the bend of the enclosure, towards the south-west, is the main entrance, preserving, very nearly, its original form. Two half-round towers, 28 ft. apart, and 20 ft. diameter, with produced flat sides, giving them a depth of 30 ft., and 30 ft. high, project 20 ft. from the curtain, and were connected by a cross wall, of which only the foundation remains, and in which was the outer gateway. These towers are not quite parallel, but their longer axes radiate slightly outwards. They are solid and have no internal projection, but from each of them a wall ran backwards 18 ft., terminating in a cross wall, in which was the second gateway, the foundations of which show that the base had an opening of 9 ft. This rectangular gatehouse must have resembled those of Porchester, and, like those, had evidently been altered to suit the Norman entrance, of which there remains one jamb of the outer gateway.

Besides the towers flanking the entrance are eleven others upon the curtain wall. These also are solid, of the height and age of the curtain, and without internal projection. They vary from 14 ft. to 20 ft. in breadth, and from 14 ft. to 16 ft. projection from the wall. They stand at irregular distances of from 14 to 35 yards. Besides the thirteen standing towers there are two displaced and broken down, and the fragments of two others, making seventeen in all. They are closest along the north-west and north fronts, where the ground outside is highest. Towards the south and east there are but few, the shallow muddy sea and the marsh being found a sufficient protection. Besides the main entrance there were three posterns, of which that to the north-east is still in use. That to the north is broken down, but its remains show it to have passed obliquely through the wall. The southern postern was probably a water-gate. In the south wall the mouth of a sewer, about 18 in. square, and opening towards the sea, has been laid open. Although the wall is for the most part thickly covered with ivy, it is pretty evident that in parts it is still capped by a later battlement, and one of the northern towers, originally 32 ft. high, bears a superstructure of 18 ft., which, from a window in its side, appears to be of the Norman period.

The wall has been breached on the north front for 65 yards, and its mass, thrown forwards, still encumbers the ground outside. To the south is a much longer breach, at least of 200 yards. This seems to have been produced by a slip of the soil, by which the foundations have been moved forward bodily several feet. At the east end also the wall has been broken down, but here its fragments, which are of considerable bulk, are mixed up with others of later date in wild but not absolutely inextricable confusion. Most of the north wall has been picked into to a considerable depth, at the ground level, but the foundation remains uninjured. This is more probably the work of the Northmen than of those who, in later days, laid siege to the Norman garrison, for these latter would have worked below the surface of the earth, and have inserted props of wood beneath the base of the masonry to be set on fire, and so to have caused the destruction of the whole superincumbent mass. No gunpowder has here been employed.

It is evident that there was formerly a ditch at the foot of the wall on the south front, full of water, where, indeed, it may still be traced. Along the north, west, and east fronts, the wall is bordered by a road, to make which the ditch, probably never very wide or deep, has been filled up. There can be no question as to the authors of the exterior *enceinte*, both wall and towers. They are all of one, or very nearly one, date, and distinctly Roman, and, which is not always the case, the towers are bonded into the walls. The substance of the masonry is very rudely-coursed flint-rubble, chiefly composed of flints and pebbles from the adjacent sea-beach, mixed with angular fragments of stone, the whole held together by mortar very freely employed. This mortar is remarkably white in colour, and contains numerous small pebbles, little if any broken tile, and a preponderance of sand. On the whole the mortar has set firmly, and holds well together the rather heterogeneous mass of materials. The face of the work, both inside and outside, is composed mainly of squared stones from Eastbourne or Beachy Head. They are generally about 6 in. by 4 in. on the face, but sometimes as large as 12 in. by 6 in. The lowest courses at the ground-level are composed of darker and far larger stones, and in the wall above are occasional double bands of tile, and sometimes of stone nearly of the colour of tile. A good deal of the facing at the lower part of the wall has been stripped off, but inside this stripping is confined to the part of the wall just above the ground-level, which is raised artificially higher than the level of the natural soil. In some places this addition is high enough to convert the lower part of the masonry into a retaining wall. It has been thought that the earth thus employed was derived from the inner ditch, an Early English work. It may be so, but more probably the contents of this ditch went to form the mound, and it is possible that the raised soil may be derived from the ditches of a British camp preceding the Roman occupation.

The Romans, who constructed the outer walls, seem to have been content with a single line of defence; but the Northmen treated the whole area after a different fashion. Within the area, at its eastern end, a mound was thrown up, table topped, and about 30 ft. high; this, though within the area, was upon its margin, and rested against the eastern wall. The material for the mound seems to have been derived from a ditch which surrounded about two-thirds of its circumference, extending from wall to wall, and which thus isolated it from the remainder of the Roman area. This ditch has been filled up, probably to give space, but its line is still marked by a slight depression in the soil. By this means a strong place would be formed very nearly in accordance with the Early English practice, having a mound or bank, with its proper ditch, and an appended court. The only peculiarity would be that the court was walled, and thus the ditch of the mound would be traversed by the masonry, and the outer side of the mound supported by it.

The Normans, who at once saw the value and took possession of Pevensey, probably were for a time content with the Roman walls as they stood, and with the palisaded citadel of the mound. At least, there is no certain trace of any very early Norman masonry. Indeed, the only masonry of Norman date at all now to be seen is a fragment of wall with a window, the remains of a superstructure upon one of the northern towers, and some patchwork in flints, and a few courses of stone laid herring-bone fashion, by which the face of another of the Roman towers has been repaired. Had the Normans of the eleventh or twelfth centuries constructed any eastern walls, gatehouses, or mural towers within the court, some trace of them would probably remain. The chapel, indeed, judging from its dimensions, was probably Norman, and the base of the font decidedly so, and it is possible that the shapeless fragments of rubble masonry which encumber the top and slopes of the mound may be of the same, that is, of late Norman date. In truth, the castle, as the Normans found it, was a very strong place. The walls only needed a battlement, and even if this were surmounted, the entrenched and palisaded mound would be perfectly defensible so long as provisions held out.

At this time, however, the Roman *enceinte* contains the remains of a strong and tolerably perfect Mediæval castle. This, as usual in such cases, takes the form of an addition to the defences of the mound, shutting it off as a citadel from the rest of the works. Advantage was taken of the broad and deep ditch extending from the east to the south wall, 210 yards in length, curved westwards or outwards, and which shut off the mound, and a part of the great area within it, and thus formed an inner ward, of about an acre and a quarter, containing the mound or keep. The ditch, which was probably supplied with water from the sea at its south end, gives off a branch northwards towards the Roman tower, called the watch-tower, and this cuts off the north-east corner of the ground, which thus forms a sort of small middle ward between the forks of the ditch. Behind the ditch is a curtain wall, near the centre of which is a gatehouse of some pretensions, and three large drum towers, of which two flank the gatehouse, and one is placed to the north of it.

The gatehouse points to the west, opposite to that of the Roman area, now the outer ward, at a distance of 184 yards. In front of it are the two solid piers of the drawbridge, 14 ft. wide, and approached from without between curved wing walls. The piers were faced with ashlar, now stripped off. The space between them is 12 ft., and may have been 10 ft. The gatehouse is composed of two half-round towers, produced backwards to contain the entrance passage. Outside, these towers somewhat resemble those of the Roman or outer gate, which may have served as their pattern. Their loops are of unusual length, one being 15 ft. long. The vents of two garderobes are seen, opening flush with the wall. One seems to be the lower end of a loop. They contain a basement, a ground, and an upper floor, looped towards the field, not vaulted, and duly provided with garderobes. The north tower, faced with sound, though rather open-jointed, ashlar, is still standing, though mutilated. In its ground-floor is a fireplace. The south tower is quite broken down. The entrance passage is tolerably perfect, although the gateway at each end is gone, as is the upper chamber for working the portcullis, of which part of the grooves remain. The passage, 12 ft. broad and 35 ft. long, was vaulted with a segmental vault, strengthened with plain broad chamfered ribs, now broken away, and in the vault, a little behind the portcullis, is a large square central hole or "meurtrière" for the defence of the passage. In either wall is an arcade of two arches, a larger and a smaller, low pointed. The larger are closed, the smaller pierced by doors opening into the ground-floors of the gatehouse.

Flanking the gatehouse, at a distance of 33 yards north and 54 yards south, are two grand round towers, each capping an angle of the curtain. The north curtain has a base or plinth slightly battering. The wall is vertical. There is no cordon between them. The north-west tower is 30 ft. diameter and has a basement, ground, and upper floor. The basement, though below the inner ward level, is on the level of the ground outside. It is arcaded, having six arches in its rounded sides, and one in its flat end or gorge. These arches have a drip of the double-scroll pattern, and between each pair springs a moulded rib, and one from each of the two right angles, eight in all. They are broken away, but their profile is seen, and the plan of the vault may be inferred. The entrance to this chamber is by a straight staircase from the inner ward, and at the foot of the stairs is a lobby on the

left or west side leading to a postern doorway placed at the junction of the tower with the curtain. In the gorge wall is a fireplace the hood of which seems to have been of timber. It is difficult to understand what this chamber can have been intended for, with its ornate details, and a fireplace, and yet half under ground.

The ground-floor is entered from the inner ward by a separate entrance, in the right or east wall of which an opening passes into an oblong mural chamber, vaulted, and contained within the curtain. This chamber has a water drain, and above it, in the wall, three bold corbels, and above these a small segmental-headed doorway, now blocked up. This is a very peculiar arrangement, and it looks as though there had been a wooden structure, perhaps a garderobe, bracketed out upon the face of the wall, over the ditch, at about 10 ft. from the ground. The upper floor of the tower was entered from the battlements, the tower rising above the wall. Only the basement floor was vaulted. Each stage is lighted, or rather ventilated, by loops, towards the field.

The southern flanking tower is nearly upon the pattern of that last described, save that the basement is not arcaded, and none of the floors vaulted.

The third tower, in the north wall, 36 yards from the north-west flanker, is of the same pattern, with the same exceptions. The staircase into the basement has a side door opening upon a postern in the east wall, with a segmental head, and from the ground-floor entrance there opens, westwards, a long mural chamber, the counterpart of that described as attached to the north-west flanker, having also brackets and corbels, and a small door in the wall, 10 ft. above the ground, as though for a timber garderobe. These are all the regular towers, but in the south wall, where a tower might be expected, is a postern, which pierces the wall at its junction with the Roman wall, and outside and in front of it is a fragment of a Roman tower, which has slipped forwards a few yards, and forms a sort of bulwark concealing and protecting the postern. It is evident that the displacement of the tower is older than the Norman period, and was taken advantage of by the later builder. In the north wall of this inner ward, between the north and north-west towers, is a large fireplace, perhaps that of a hall. The kitchen was probably in the north-west tower, and the large mural drain connected with it.

The mound which occupied the east end of the castle and carried the keep, remains tolerably perfect, though much encumbered with ruins produced evidently by gunpowder. Against its east side, and supporting the mound, is a Roman tower, which was worked into the keep, its solid top being battlemented. The mound has a spur of earth towards the north, probably connecting it with the north wall, but nothing definite can at present be ascertained, though the foundations upon it, if laid open, would probably disclose something.

As the Mediæval castle is placed within the eastern end of the Roman area, its eastern side osculated with the Roman boundary, which is here common to both areas. About four-fifths of the enclosing wall of the castle is Mediæval, but the remainder, that towards the east, is Roman, which is thus common to both fortresses. Commencing at the south postern, where the two walls are in contact, to the great disadvantage of the masonry of later date, the Roman wall extends, partially propped up by a later buttress, until it reaches a Roman tower that connected it with the keep mound. Beyond this, passing southward and eastward, to where the Mediæval wall springs from the Roman *enceinte*, the Roman wall has been left to support the mound, but about 6 ft. in front of it a Mediæval wall, 9 ft. thick, has been built, probably to afford more space above, and to assist in supporting the earthwork. The castle has been attacked on this side, or else those who dismantled it, thinking this the strongest part, have mined and blown it up, for the glacis for many yards is covered with enormous masses of masonry, which have evidently been displaced by gunpowder, exploded in large quantities. At one part, abutting upon the Roman tower, the two walls are seen. About 20 ft. of the Mediæval wall, 9 ft. thick and 10 ft. high, stands undisturbed, though above this height its superstructure has been blown off. Behind it is the Roman wall of about the same height, not only reduced in height by the explosion, but tilted forward. This is what has happened in this quarter, and the history of it is clear, even in the midst of so great a confusion.

Within the Mediæval or inner ward an excavation shows the position and plan of the chapel, with a nave 40 ft. by 8 ft. or 9 ft. broad, and chancel of 12 ft. by 11 ft. A fragment of the font has been preserved. The chapel is, no doubt, of Norman date, and older, therefore, than the castle in its present form. There is also a rude pillar piscina, or perhaps a holy-water stoup, such as is now and then found in Norman buildings. There are one or two in Glamorganshire. The free chapel in the castle is mentioned in the grant of John of Gaunt. The well also has been discovered at the foot of the mound. It is cylindrical, 7 ft. diameter, and lined with ashlar to a depth of 52 ft., below which it is square and lined with timber.

The Roman works at Pevensey have been explored and examined with great skill and success by Mr. Roach Smith. Unfortunately the Mediæval castle has been less fortunate, and has not been accurately described. A short but complete and brilliant description of Pevensey, and a notice of the part it played in the campaign of 1066 will be found in Mr. Freeman's "Norman Conquest." It also plays a conspicuous part in his recent life of the Red King.

G. T. C.

THE EXHIBITION AT TRIESTE.

THE city of Trieste is now celebrating the five-hundredth anniversary of its annexation to the Austrian dominions by an exhibition, which has for its purpose the display of products of Austro-Hungarian industry in various branches. Matters relative to navigation are treated with a completeness which gives the exhibition in this respect almost the character of a special nautical display. Thus codes of signals, rules for avoiding collisions at sea, nautical calculations, maps, instruments, books of reference, &c., are shown in a systematic manner. Submarine electric illumination also forms a subject of illustration. The hygienic arrangements of the port are designed with a view to prevent the introduction of epidemics from the Eastern countries between which and Trieste important trade relations exist, and the various official bodies connected with the sanitary inspection of Austrian vessels have placed in the exhibition various interesting records of their activity in the cause of sanitation.

The display of Oriental furniture is well arranged, and the mineral wealth of the Austro-Hungarian monarchy is exemplified in a very complete manner. Sections of the woods grown in Croatia are exhibited, and form an interesting display.

One notable feature with respect to the exhibition is the absence of art from the subjects illustrated. As, however, there has recently been at Vienna an exhibition of art, the Trieste display may be considered as appropriately following it up. The situation of the exhibition on the seashore is in harmony with the general character of the display. The Milan pavilion is spoken of as being specially effective, being built of elegant ironwork on a solid stone foundation. The view of the exhibition and its surroundings from the sea is said to be very picturesque, the grounds being laid out in artistic style.

THE STATE OF WORDSWORTH'S GRAVE.

THOMAS DE QUINCEY records that on the 23rd of April, 1850, Wordsworth was "buried in the green churchyard of Grasmere, between a yew tree of his own planting and an aged thorn." In this "churchyard among the mountains," beneath "a plain blue stone, a gentle dalesman lies"; the stream of the Rothay murmurs near his grave in the valley under the shelter of Fairfield,—Faarfell, the mountain of the sheep,—and the crag where Sidrophel and the Ancient Woman,—

> "Dread pair that, spite of wind and weather,
> Shall sit upon Helm Crag together."

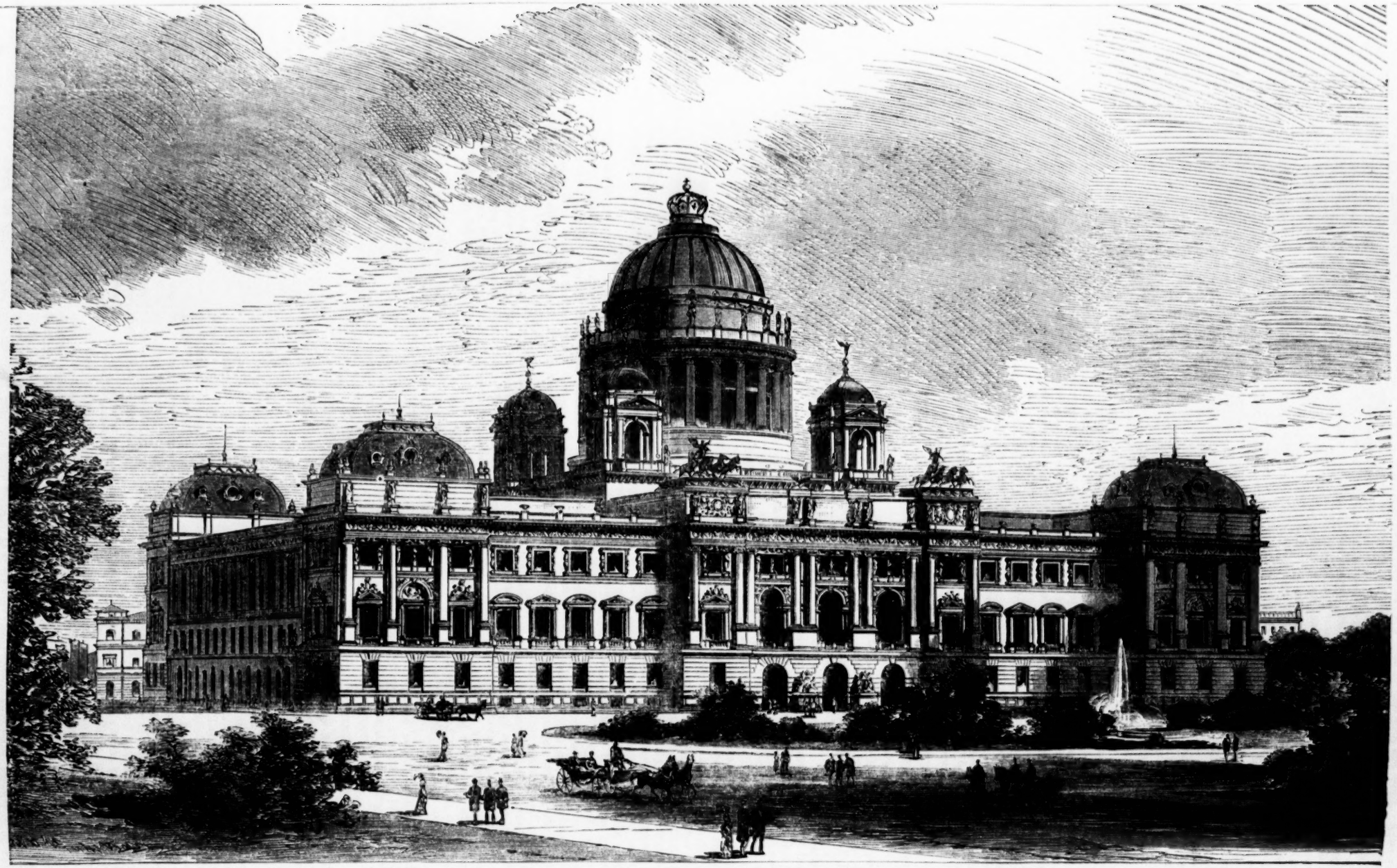
In this churchyard are also laid the poet's wife, "the phantom of delight when first she gleamed upon my sight," his sister, "impassioned Dorothy, the gift of God," and his daughter Dora. To this resting-place of a family that were "lovely in their lives, and in their death were not divided," pilgrims have flocked, as to a holy shrine, from all the continents of the world. We visited the spot last week. After viewing a marble medallion head of Wordsworth, in St. Oswald's Church, a strange old building, very rude and rough, with a roof that recalled the architecture of a Highland cottage, we went in search of his grave. Though one of the tiniest of country churchyards, we had actually to ask a woman, who lived at the gate, to tell us where the grave was. We saw a path among the grave mounds, about 1 ft. in width, and followed it, and it led to a dirty dark corner, where several blue-black head-stones of slate stood. Could this be the resting-place of Nature's tender lover? It was; and we felt a chill come over us. The day was beautiful: the sun was shining in a cloudless sky, but everything round the spot we had come to seek seemed decayed and withered, like a grave in the centre of a dirty smoky town, not in beauteous Grasmere. No green grass was there, all was dull, dank, and depressing. The poet's corner must be badly drained, for we could scarcely get near enough to read the inscription, in consequence of an accumulation of water that formed a trench at least an inch deep at the base of the stone curb that held the iron rails surrounding the grave. The contrast between the sunlit mountains and the gloomy surroundings of his grave who sang of them so lovingly and well was extremely painful. Must Wordsworth's grave become an "ancient monument" before something will be done for its preservation?

THE NEW ROYAL ST. ANNE'S ASYLUM, REDHILL.

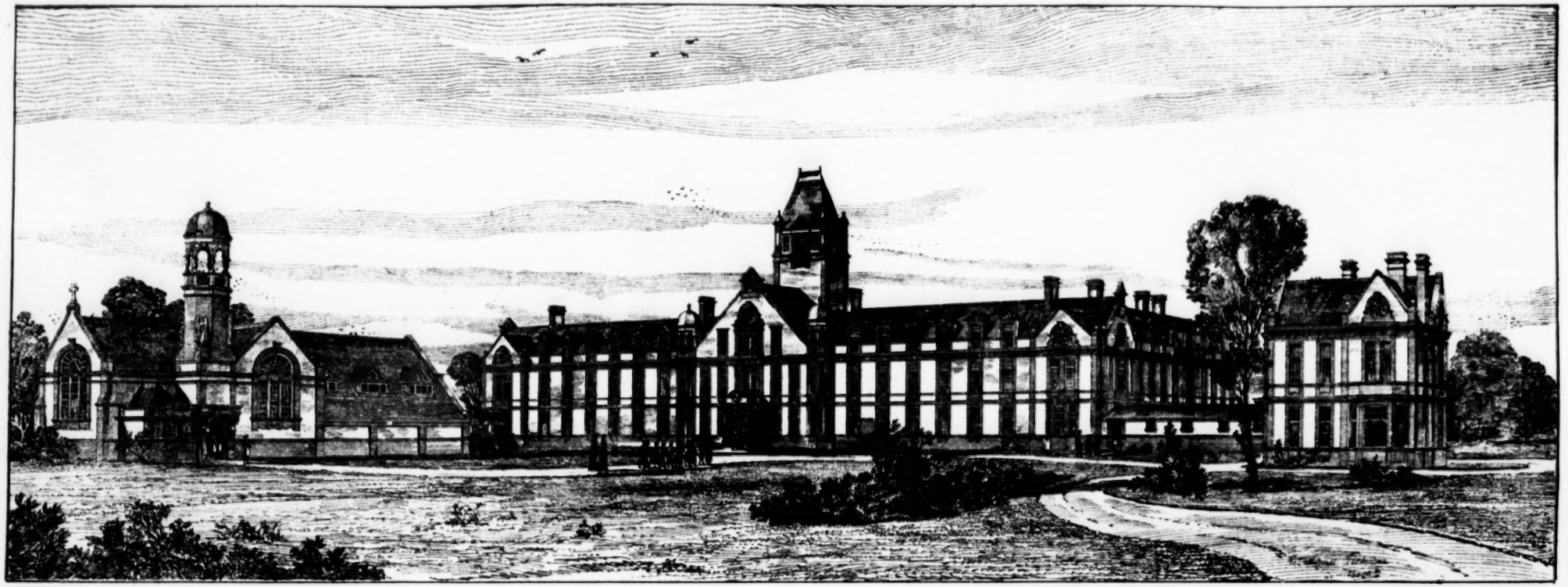
THE accompanying design for the New Royal St. Anne's Asylum, Redhill, was one of the two submitted in competition by Mr. A. Hessell Tiltman, M.R.I.B.A., architect, of 7, John-street, Bedford-row. The plan attached will describe the general arrangement of the main building. Accommodation is provided for 260 boys and 140 girls, together with the necessary apartments for the officials attached to the establishment. The chapel is placed, as shown in the view, immediately in front of the building, and the head-master's house immediately to the right. The infirmary is at the north-eastern part of the site, well isolated from the general building, and with a southern aspect. Immediately adjoining is the cricket-field. Attention, it is claimed, was directed to the proper sanitary arrangement of all parts. The lavatory blocks in the centre of the boys' court are placed mid-level between the ground-floor and the level of the playground, so as to be conveniently accessible from either. The author claims for this plan great simplicity and compactness of arrangement, together with easy intercommunication between all parts for the officials. The amount to be expended being but small, no attempt was made to gain effect at the expense of ornamental features, the author relying entirely upon the grouping of the various parts, and the colour of the materials used. The cost of the design, cubed up at an average of 7d. per foot, was estimated to be 35,820*l*.

An alternative scheme was submitted also, interpreting the conditions less liberally, and capable, consequently, of being executed for a somewhat less amount.

The Railway Appliances Exhibition.—The arrangements for holding the exhibition of improved wagon-couplings and other railway appliances at Darlington on the 3rd of October and four following days, under the auspices of the Amalgamated Society of Railway Servants, and in connexion with their annual congress, which will open on the same day, have been reported to the London committee at the chief offices of the society, City-road, as progressing satisfactorily. Many applications have been made by inventors and patentees for space; and, from the nature of some of the applications, it is believed that in improved signalling arrangements and modes of electric communications between guards, passengers, and drivers, the exhibition will be particularly interesting, not only to railway *employés*, but to the travelling public. It was reported that in order to have the improved wagon-couplings practically tested, the North-Eastern Railway Company have consented to provide wagons for the competitive trials, which will take place at the Great Northern sidings, Bank Top, on Thursday October 5.



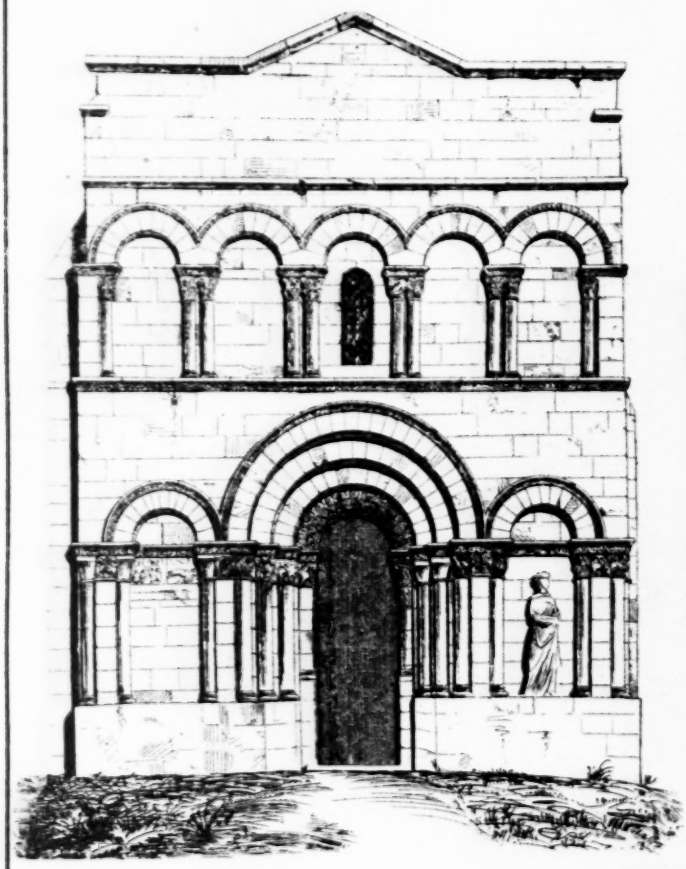
THE GERMAN IMPERIAL PARLIAMENT HOUSE.—THE DESIGN BY HERR FRIEDRICH THIERSCH.



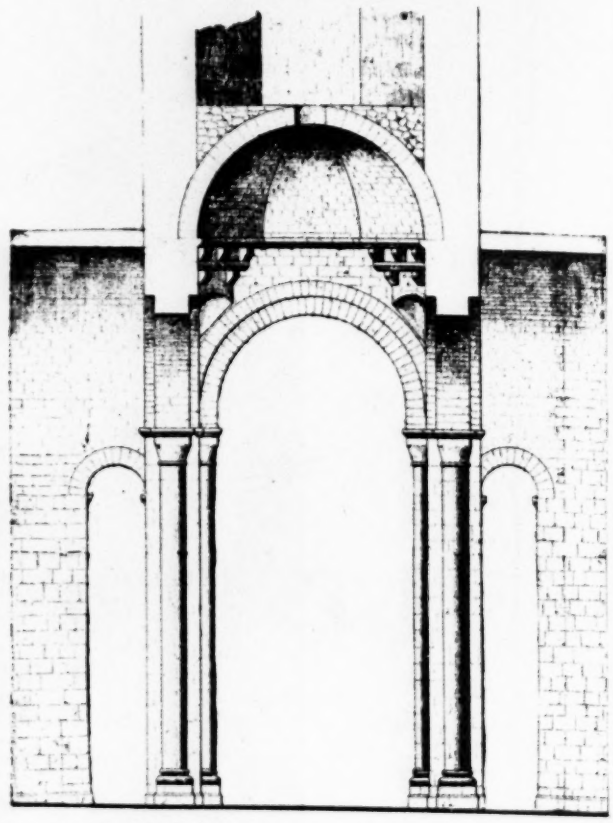
DESIGN FOR THE NEW ROYAL ST. ANNE'S ASYLUM, REDHILL.—By Mr. A. Hessell Tiltman, Architect.

Whiteman & Bass, *Photo-Litho* 236 High Holborn.

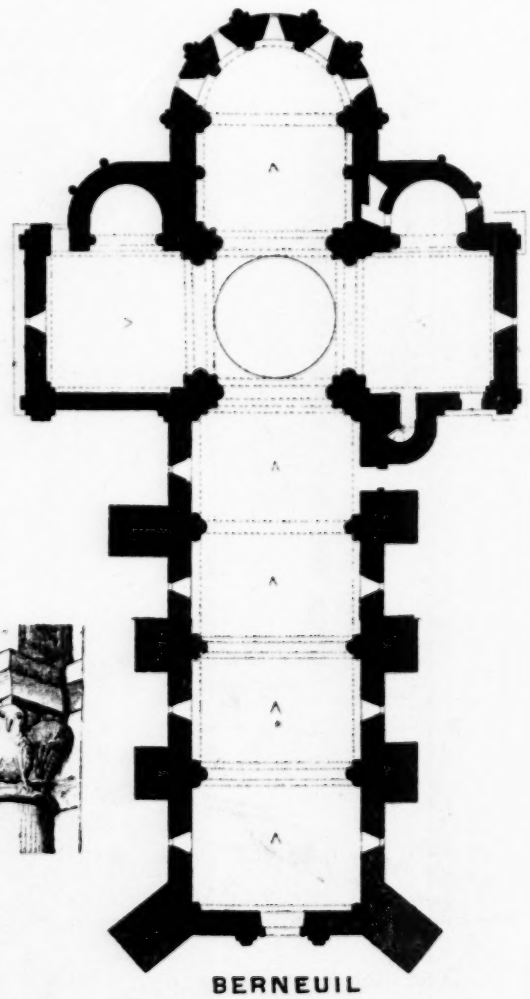
Wyman & Sons, Printers, 74 Queen St.



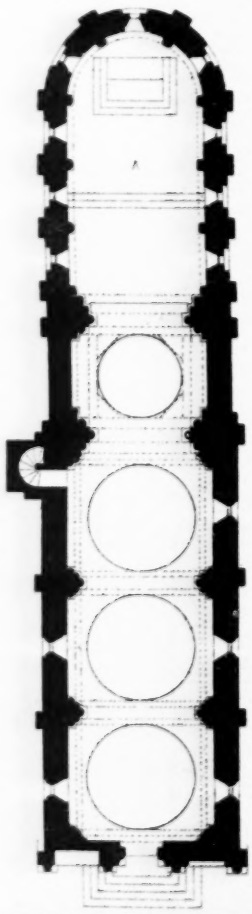
DIRAC, WEST FRONT.

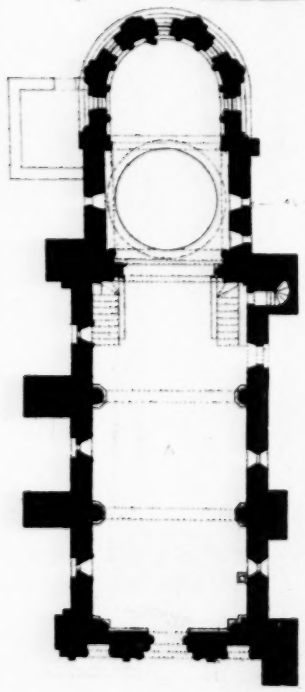


CHATEAUNEUF, TRANSVERSE SECTION.



ROULET





PLASSAC

BERNEUIL

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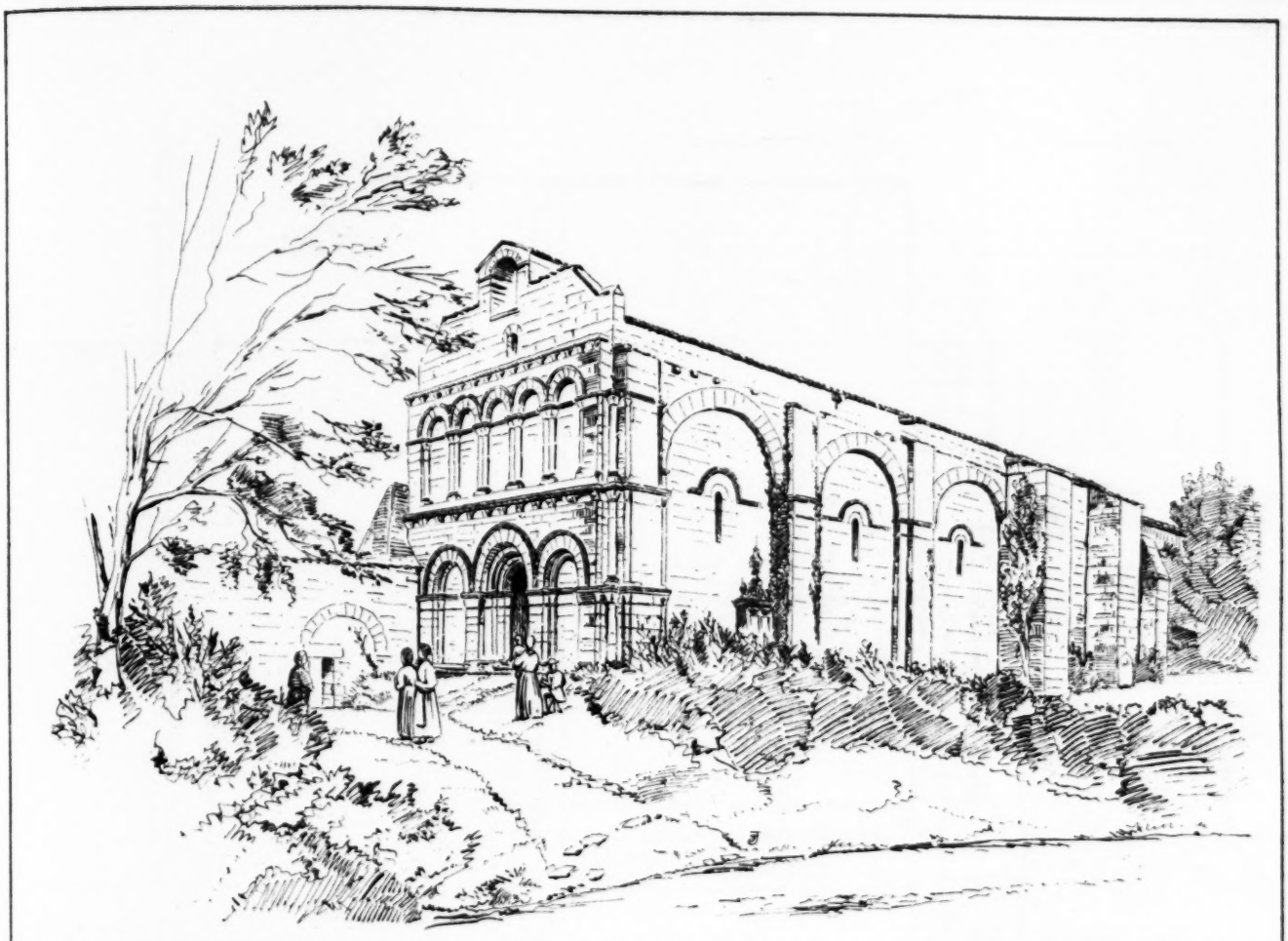
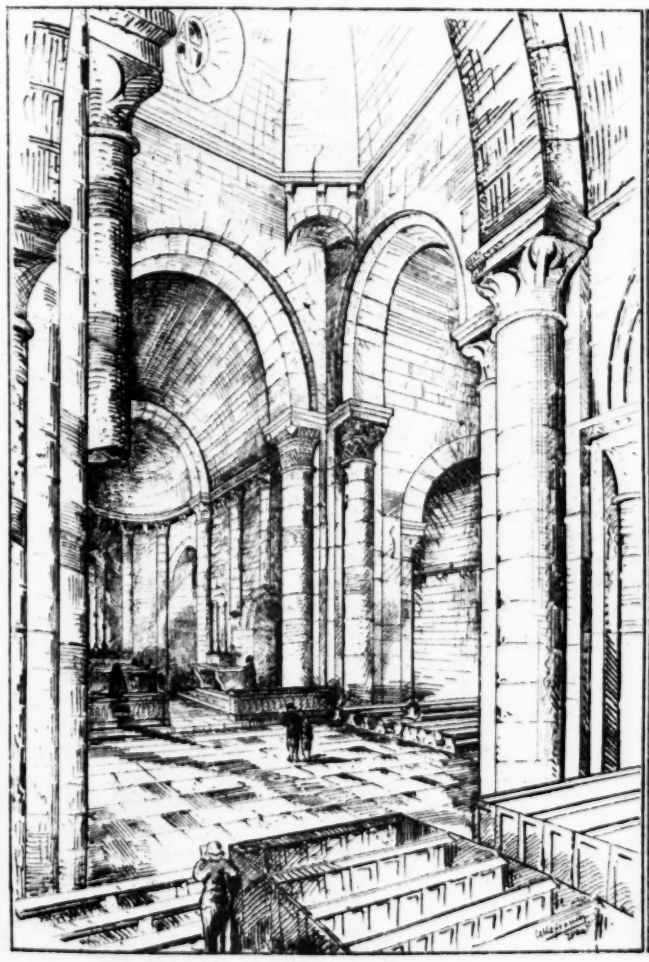
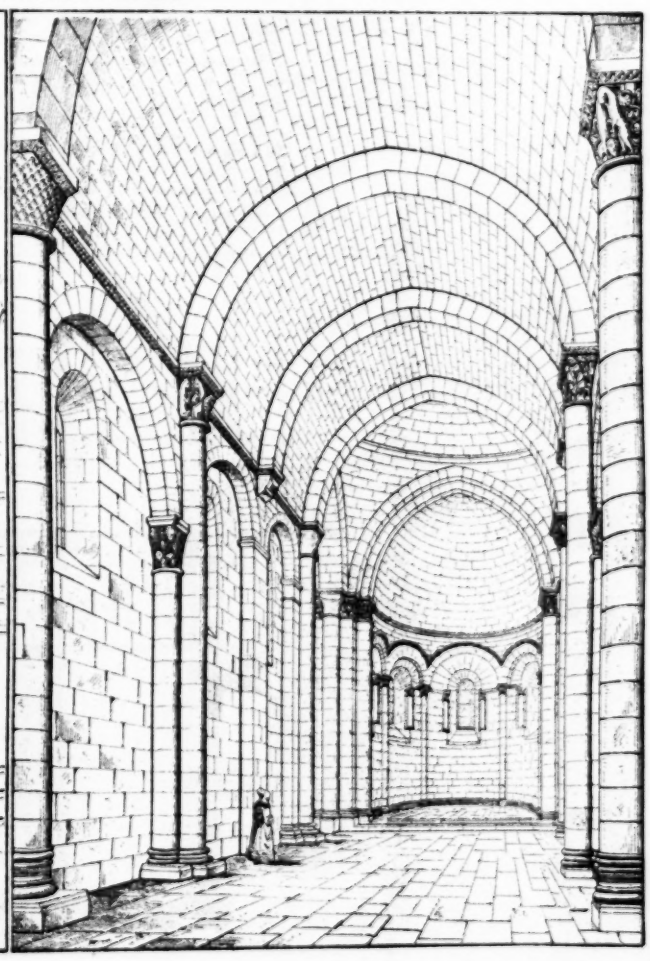
DOMED CHURCHES IN THE DEPARTMENT OF CHARENTE, FRANCE.



CHILLAC·FROM·THE·SOUTH-WEST.



CELLEFROUIN·FROM·THE·NORTH·AISLE·OF·NAVE·LOOKING·EAST.



MOUTHIERS, LOOKING·EAST.

Whiteman & Bass, *Photo-Litho*

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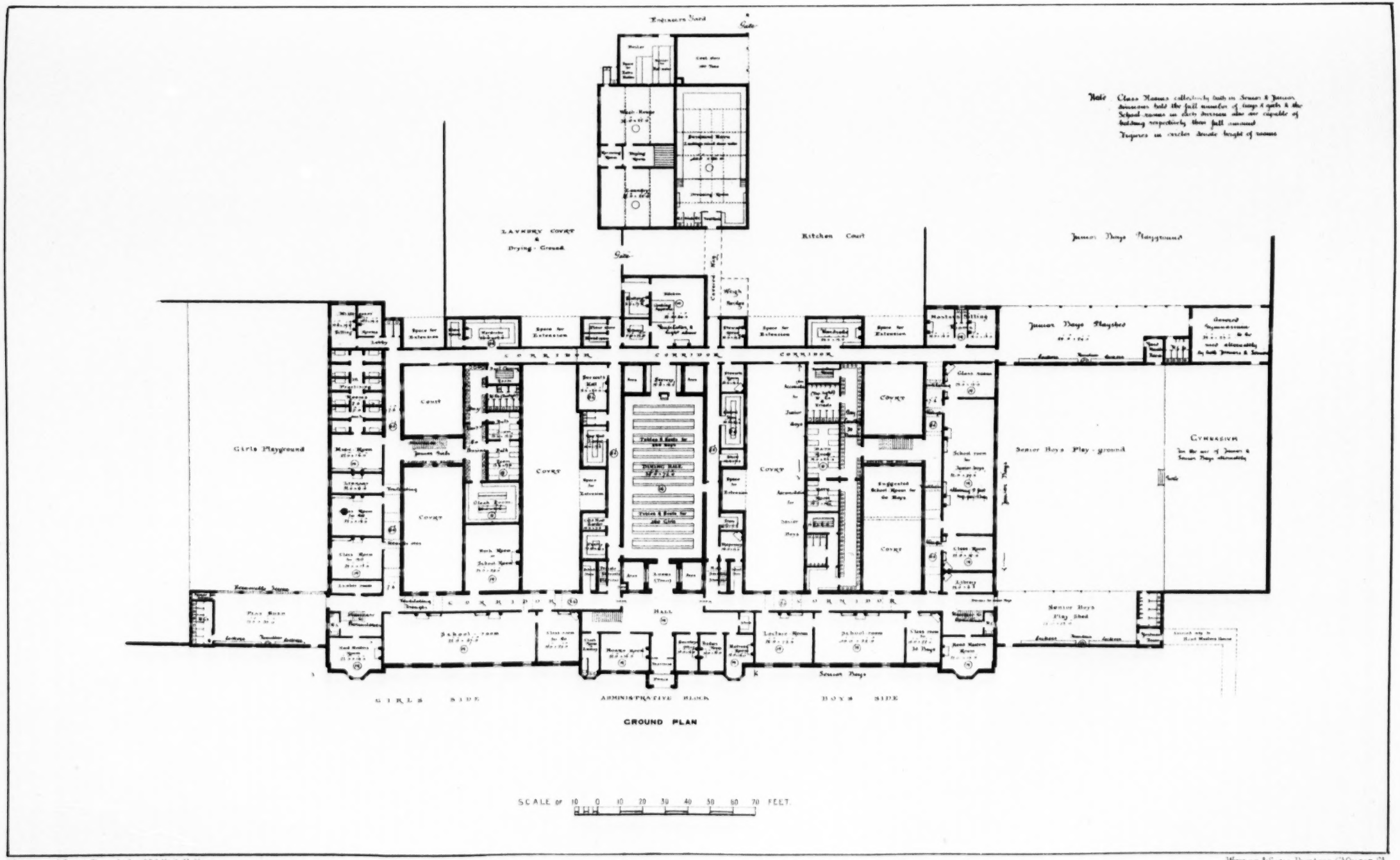
DOMED CHURCHES IN THE DEPARTMENT OF CHARENTE, FRANCE.



GROUND PLAN

SCALE OF 10 0 10 20 30 40 50 60 70 FEET.

Whiteman & Bass, *Photo-litho* 236 High Holborn

Wyman & Sons, Printers, 74 Queen St

THE COMPETITION FOR THE HOUSE OF THE GERMAN IMPERIAL PARLIAMENT.

HERR THIERSCH'S DESIGN.

As we have observed on a previous occasion, no fewer than 189 designs, with about 2,000 sheets of drawings, were the result of the second competition, which was to give to United Germany the long-desired House of Parliament. With comparatively few exceptions, those designs represent a performance which calls forth the respect of those able to judge. But, as we have already pointed out, it is open to question whether the selected design in its exterior form is at all a worthy symbolical embodiment of the ardent aspirations of generations of Germans. The mistake, however, may be explained by the unusual nature and magnitude of the work which German architects were called upon to undertake. If, amongst all the designs sent in, there is not one which fully corresponded to the requirements of genuine monumental art, the reason is to be sought in the difficulties which beset the execution of the task. Architects were expected, as is too often the case, to make the best of a site offered to them, no matter whether its nature was at all in consonance with the conditions which the erection of such a monumental edifice imposed upon them.

It is necessary to recapitulate some of the instructions which were to guide competing architects in working out their designs. The portion of the Königsplatz set apart for the Imperial Parliament House forms a parallelogram 446 ft. long and 312 ft. deep, the limits of which were by no means to be exceeded. The two longest sides of the building are to face on the west towards the Königsplatz with the triumphal column, and on the east towards the Sommerstrasse. The northern and southern sides are bounded respectively by the line of street and the paths of the Thiergarten leading to the interior of the city. It is evident that this position points to the Königsplatz as the direction towards which the dominating principal front with a wide portico was to face. But as the traffic will flow towards the building from the other sides, it was impossible to place the regular approaches in its western front. As might have been expected, in not a few of the designs the Königsplatz façade was chosen for placing the principal portal, as being most suitable for displaying the most prominent architectural features of the edifice. Although this view may be more or less justified by the purpose which such a portal would serve on special occasions or as an approach for the court, it appears contradictory that the principal entrance should not be on that side of the building in which the most immediate and principal business of the house is carried on. But quite apart from this consideration, and whether the principal entrance be in its western or eastern façade, the architect had to meet another obstacle, the comparative narrowness of the site, which placed great difficulties in his way in freely developing his design on a comparatively short axis. In order, therefore, to obtain the required space for the prescribed covered vestibule, with adjoining cloak-rooms, the great sessions-hall, which would naturally be sought in the centre of the whole edifice, at the intersection of the two axes, and for the hall which is to serve as the lobby for the members and as a festal hall for special occasions, or for large committee meetings, many of the designs placed the principal entrances in the short façades of the building, preference being given to the southern side, that facing the Brandenburg Gate. The advantages of such an arrangement, again, are counterbalanced by the great drawbacks which are as difficult to avoid in placing the rooms along the longitudinal axis of the building as by their partial grouping in its transverse axis.

We have already freely criticised in these columns the design of Herr Paul Wallot, of Frankfort; but we refer to it here again because we wish to compare it with that of his rival, Herr Friedrich Thiersch, of Munich, whose design, as we have on a former occasion indicated, received also a first prize, but was not deemed worthy of the honour of execution. We give a perspective view of Herr Thiersch's design in the present issue of the *Builder*. The two designs are different, both in exterior form and ground-plan, and yet they have several features in common. They are both wanting in a portal having a claim to architectural importance, its place being supplied by plain semicircular-headed openings,—entrances they can hardly be called,—distributed over the four fronts, and cut, as it were, into the ground-story. This mode of dealing with a difficult subject, arises from a desire of obliterating, to some extent, the inferior position accorded to the Königsplatz façade. The place assigned to the sessions-hall at the intersection of two wings, by which disposition four courts are formed in the parallelogram occupied by the edifice, is the same in both designs. The latter also agree in assuming the principal entrances to be in the narrow fronts of the building. But only in the design of Herr Thiersch the entrance of the south front is, at the same time, the point whence the grouping of the rooms proceeds, while Herr Wallot proceeds in reality from the Königsplatz. To the two entrances of the narrow fronts, Herr Wallot adds here a third opening, direct into the vestibule and upon the principal semicircular staircase leading from it. Three open arches, in the centre one of which it is proposed to place the equestrian statue of the emperor, connect it direct with the festival hall. Passing through the latter, the sessions-hall, the "house," is reached, while the galleries behind lead to the refreshment-hall, placed in the Königsplatz front, wide corridors to the right and left establishing communication with the other parts of the building. One of the principal objections raised against this arrangement is that it lowers the festival hall to a mere passage, and shifts the sessions-hall from its proper position, the centre, towards the east, to where the cupola is placed. The latter is intended to supply light by day, while at night the hall is to be illuminated by the electric light throwing its rays also outwards. Something more imposing seems to be wanting on the western façade than the figure of Germania rising on a broad base, to counterbalance the cupola on the east.

In contrast to Herr Wallot, Herr Thiersch developes his plan, as already remarked, in the direction of the longitudinal axis. Upon the entrance on the south front follow spacious stairs, and upon the latter a hall, both of square form. On either side of the hall follow in the transverse axis, first a semicircular room lighted from above, and next an oblong room receiving its light from three large circular-headed windows, serving as reading and refreshment rooms, while, in proceeding from the hall in a straight direction, the sessions-hall, ending in a semicircle, is reached. This mode of grouping the rooms assigns the most important position to the festival hall, in the centre of the edifice, with the cupola above it, the "house" occupying a secondary position. The latter is shifted to the north, to a position in the building which outwardly is the least striking, the part of the façade inclosed by the centre and corner projectures. This arrangement evidently did not find much favour, but, in other respects, it seems the more preferable one. Herr Thiersch's design shares with that of his successful competitor this disadvantage, that, being placed central and lighted exclusively from above, no direct ventilation is possible. In both designs, the sessions-hall of the Federal Council, which, ideally at least, corresponds with that of the Reichstag, is relegated to the north-east corner of the building, which, in the case of that of Herr Thiersch's, is justified to some extent by the nearness of the "house," but in that of Herr Wallot's appears to be chosen perfectly arbitrarily. In consequence of taking up more space for vestibule, stairs, and central hall, Herr Thiersch proposed two stories above the ground-story, which is treated as socle, and thus his building would have been of higher elevation than that actually chosen. His design may be less attractive, but it appears to us that the sober earnestness of its forms agrees well with the compact features of the whole edifice.

The Polytechnic, Regent-street. — The syllabus of the evening classes now open here to the public is issued. Attention should be called to the practical trade classes, and also to the proposition to grant an "Industrial Diploma" to tradesmen who pass through a course of study combining both theory and practice, extending over three years. How this will work we do not exactly know. We are bound to confess we do not look with any particular favour on the self-created examining bodies which are bringing themselves forward.

THE DOMED CHURCHES OF CHARENTE.

THE "SHARPE MEMORIAL" VOLUME.

SHORTLY after the publication of this volume we gave a careful account of its aim,* finding it "honourable to those who have executed the memorial, and to him in whose memory it has been done." We also gave an account of the twelfth-century architecture of Charente, which is so well illustrated in the volume,—an architecture in which we find stone domes used instead of the cross-vaulting met with elsewhere at the same date. The book is the memorial of the Architectural Association to one of its members, who did good service to the world at large, and in the later years of his life conducted a number of members of the Association to different fields of architectural study, shared and directed their labours; and led the members to put their measured drawings, sketches, &c., into shape to be used, in the first place, as lecture diagrams, and afterwards, when reproduced by photo-lithography, as book illustrations. The plates in the volume are reproductions of the drawings used at the lecture delivered by Mr. Sharpe in June, 1876,—that is to say, of some of them, for the profusion of drawings put upon the walls that evening was such as has rarely been seen at an architectural lecture. A selection was made when the sixty plates of the volume were prepared. Some of the material as yet unused appears in the two pages of illustrations given in this number of the *Builder*. These illustrations will show our readers the class of work which was prepared after Mr. Sharpe's excursions, and the kind of plates they will find if they possess themselves of copies of the volume.

A few remarks may appropriately be made with reference to:—

1. *Plan.*—The churches are, for the most part, without aisles, and sometimes without transepts. Roulet is one of the most elegant of those which have a series of domes. A longitudinal section of this church is given in the work, and an interior perspective, &c. The tops of the domes appear to be worked to an even face, as though they had been intended to be seen externally, as seems to have been the case at St. Front, at Perigueux; usually in Angoumois they are rough, and covered by timber roofs. Domes were used for covering the centres of crossings earlier than as vaulting to naves. This, in the older churches, is of the barrel-vault form, either semicircular or pointed. Plassac is another example of a church without transepts. It is a church of a remarkable kind in many ways; the apse, the tower and spire above the dome, and the west front are very characteristic examples of the special features of the churches in this district. The spires are not steep, and are formed of stone, shaped so as to give the appearance of scales, presenting the idea of a fir-cone or pine-apple, and have thus obtained in France the appellation "*en pomme de pin.*"

Berneuil is a fine example. A solitary dome is put at the crossing, barrel-vaults being used elsewhere. The various modifications of the type of general plan in this church are given very effectively in the parallel of plans which forms plate 2 of the volume: a dozen plans, all to the same scale, appear there. At Puyperoux and Mouthiers are to be found examples of a direct communication between transepts and chancel, towards which there would seem some approach at Berneuil. At Puyperoux the idea of such communication is carried still further,—the north and south respond piers at the crossing are also isolated,—passages run behind them leading from the transepts into the nave. The plan of Berneuil calls to mind another feature seen in splendid development at Coudéon and Barbezieux. At Coudéon, some of the buttresses added to the earlier church are 12 ft. wide with 20 ft. projection, which, in a church of very moderate size and height, presents a very strange appearance. The large buttresses in this and several other churches were added at a period subsequent to their first erection to counteract the great thrust of the barrel-vaults. In the volume, a well-drawn view of the picturesque, but much altered and dilapidated, west front of Berneuil is shown. The very elegant original design of the twelfth-century west front is strangely modified by the addition of great buttresses at the angles and along the nave wall.

2. As to the *domes*, the reader must be referred

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* See vol. xlii., p. 728.

to the volume itself for a painstaking account of their structure, and a recital of the various conjectures with reference to their erection in this particular province. In the interior view of Mouthiers the dome is just seen, a very perfect dome slightly elliptical in plan. The arches are pointed, but very slightly so; this form of arch introduces a modification of the true Byzantine pendentive, which requires for its simplicity of form semicircular arches. The interior view of Cellefrouin (cellam Sancti Frontini, as the editors do not fail to note) shows a domical vault at the crossing springing from slightly cut-off corners supported by squinches; and the section of Châteauneuf shows a vault octagonal on plan, supported by squinches and corbels,—resembling Montbrun, shown by a view on plate 17. The squinches, carrying true circular domes, indicate early date; the pendentives proper are of later introduction.

This church of Châteauneuf alone, among those of Romano-Byzantine type visited during the excursion of the Association, has side aisles, and the arches are acutely pointed; a section is given, plotted from measurements, on plate 3. From the sketches in this number, the stately simplicity of some of these churches can be judged. Cellefrouin is a fine masculine specimen of rather early Romanesque; Mouthiers is for the most part of the late Romanesque or early Transitional periods,—all the arches of construction in it are pointed, whilst those of decoration are semicircular.

3. Two *west fronts* are shown in our illustrations. The greater part of the church at Chillac is practically ruinous. The barrel-vault of the nave has been too heavy for the walls, and the cupola of the crossing is cracked. The west front is without the original termination, which has shared the fate of several other upper stories in the churches visited. The church at Chalais has a really magnificent lower story,—a large central portal with five orders in jamb and arch, and arches at each side of it; but the rest of the front is a blank wall. Chalais has several plates devoted to its illustration. The fronts appear usually to have marked the completion of the work, and to have received the greatest share of ornamentation. Usually the capitals are richly adorned with figures or foliage, and across some of the fronts is carried a rich, broad frieze, continuous with the capitals of the ground-story arcade. At Chillac the second story is divided from the ground story by a fine corbel table. At Dirac, about seven miles south-east of Angoulême (the head-quarters of the excursion in 1875), the west front is of the same type as that at Chillac, but with differences of detail. All the fronts of this type suffer from the smallness of the angle piers. In the other type of treatment, of which the very beautiful desecrated Cistercian Abbey Church of Châtres (near Cognac) is an example, the mass at the angle is somewhat increased by large vertical shafts being carried up from the ground to the string-course at the starting of the gable. The fine front of Lanville also has large shafts, which are repeated on each side of the central doorway; and from these shafts arches are thrown across in the upper portion of the second story of the front. The details and general form of this front render it a very interesting one, but the angles, albeit strengthened by the shafts, do not gain the quality of solidity which is of much value always, especially when wall surfaces are well filled with arcades.

4. The illustrations of the *ornamentation* fill a goodly number of plates in the volume, and are most of them admirably drawn, some drawings being really exquisite in touch. "The extraordinary richness of the ornamentation in the province," said Mr. Sharpe in the lecture before referred to, "is a most remarkable characteristic. It is of two kinds, firstly, figures of men, animals, and birds, and nondescript compositions of all three; and secondly, of foliage only. The first kind is more or less barbaric, the latter very rich and pure. As regards the *chapiteaux historiés*, although there may be some deeper meaning in them than at first catches the eye, they more probably indicate the familiar struggles of the inhabitants in battle or in the chase than any allusions to Biblical texts." The stag-hunt and battle-piece given in plate 41 may well have been in the mind of the lecturer. The small capital with the bird in our illustration is from the apse of Plassac, of the exterior of which there is a good drawing in plate 25. The other capital is from the Church of St. Hilaire, at Poitiers, brought in here as a reminder of the similarity in general expression between the Romanesque capitals there, and those farther south, at Cellefrouin (plate 13), &c.

We may add to our previous notice that the "Sharpe Memorial" is 12 in. by 10 in.; and that, of the sixty plates, eighteen are devoted to measured drawings, plans, sections, and elevations, nine to exterior views, six to interiors, and the remainder to details. A map of the department is prefixed to the text, which extends to forty-eight pages,—that is, the text with reference to Charente. The purely "memorial" part of the volume is put at the commencement, and terminates with a very careful and complete list of Mr. Sharpe's publications, filling eight pages, in itself a memorial which might be reproduced with advantage for insertion in copies of his works. We remember with some satisfaction the assistance given by the *Builder* by publishing the list so that it might have the advantage of critical testing when improvement was possible. Messrs. Birdsall & Son, of Northampton, deserve mention for a very refined piece of book-binding, with coloured inlays and admirable tooling, both blind and in gold. The subscription price of the volume is a guinea and a half, and there are still a few copies beyond those subscribed for by members of the Association.

The honorary treasurers of the publication fund,—Mr. John Quilter, of 10, Brunswick-square, and Mr. S. Flint Clarkson, of 36, Great Ormond-street,—will no doubt be glad to see the remaining copies reach public libraries or the hands of students. The task, commenced fully five years ago, will then have been well completed in all respects.

ART AND ITS INFLUENCE ON THE MASSES.

IN the Art Department of the Social Science Congress at Nottingham (presided over by Mr. G. Aitchison, A.R.A.), one of the special questions for consideration was, "In what way can the influence of art be brought to bear on the masses of the population in large towns?" The first paper read was that of Mr. T. C. Horsfall. In the course of his remarks, the speaker contended that a strong love of beauty was, as a rule, gained only by those who, in childhood, habitually saw beautiful things, had many pleasant associations with them, and were taught to perceive their beauty by persons whose opinion they cared for; and of those who had gained sensibility to beauty, many lost it if they ceased for a long time to see beautiful things and to think about their beauty. Many of the children who live in large towns had no chance of becoming familiar with birds, flowers, grass, ferns, trees, or any other beautiful things; but most town children saw such things occasionally, and as they saw them chiefly on holidays, probably they had some pleasant associations with them. If love of art was to be common among the people of large towns, the slight acquaintance with beautiful things thus gained must be increased by the help of art. Good coloured pictures of common birds, flowers, trees, butterflies, country lanes, farmyards, coast scenes, that is, of the beautiful things and places which town children saw in town parks and when they go out of town, should be placed in every school, and the attention of the children should be directed to the pictures by brief addresses and by labels containing brief explanations, so that when they saw any of the things represented they might look at them more carefully, and come back to the pictures with more interest for having seen the things. There should also be pictures of historical incidents and places mentioned in the children's lesson-books. To induce attention to, and interest in, art-methods, coloured plates and good woodcuts of the same objects should be placed side by side, and the differences in the modes of representing form and colour in different arts should be pointed out. Full descriptions of wood-engraving, etching, and other processes, with all the appliances used in the processes, should be placed in an art gallery in the town, and the fact that they can be seen there should be stated on the labels attached to the woodcuts, &c., in the school collections. Each collection should contain a few examples of well-shaped jugs, cups, &c., which should have labels stating that they are well shaped, and each school should have a large glass case for growing plants, and at least two casts from sculpture, showing what the bodies of men and women ought to be like. When chromolithographs were used in school collections, each should have a label referring to a good picture of the same subject in the art gallery. The central art gallery ought to be opened on Sundays, and, to induce workpeople to come to it often, music ought to be given in it on one or two evenings every week. As good art was essentially right beauty of appearance, if we wished busy people to care for it, we should show it to them applied to things which they cared for. One principle of great importance was almost entirely disregarded by managers of art galleries. To make people take a keen interest in art, we must show them things that really interested them. Judging from the language of many people, one would think they placed the greatest value on things the most worthless. Success in bringing the influence of art to bear upon the masses would only be attained by persons who knew the importance of art, and of the right appearance of the whole life, which was of more importance than what was usually called art. Rightness of appearance was of far greater importance than things which did not deeply influence human feeling. In the art gallery there should, therefore, be a model small house, to show how a small house in town can be made to look pleasant, which should contain all the things which are needed in such a house, all well made, of good form and colour, and it should have on its walls a few good pictures. The gallery should contain a small collection of casts from the best Greek sculpture, and good examples of the products of all the industrial arts. Each should have a label stating that it is good, and, if this be possible, explaining why it is so. Some of the pictures in the gallery should represent the most beautiful places near the town, the most interesting buildings in and near it, interesting events in its history, the trees, flowers, birds, butterflies, &c., to be seen near it. Of pictures of this kind copies,—photo-engravings, etchings, good chromo-lithographs,—should be made. Framed examples of the copies should be shown in the gallery, and the price of a copy and of a frame should be stated on a label. Similar labels should be attached to other good etchings, engravings, &c., in order that workpeople may learn how many kinds of good art can be obtained at a small cost. Every picture should have an explanation of its subject, and if the subject be one which is not familiar to most people, its connexion with familiar things should be pointed out. To encourage study of art-methods pictures should be placed side by side with etchings and other copies of them, and groups should be formed of representations by different kinds of art of the same subject. Mr. Horsfall, adverting to the subject of female dress, urged that ladies should be induced to dress more neatly, and with a truer sense of beauty. When appearing in public they should wear a dress which could be obtained by poorer women. As comparatively few people saw the need of the objects for which they were working, it necessarily fell on a smaller number of persons. By the masses of the population acquiring a knowledge and love of art, we would obtain more and better designers. It was surely unquestionable that the knowledge and love of art was indispensable to our population. Religion was one of the strongest motives to resist temptation, but it behoved them to declare the truth that thousands must be incapable of just feelings unless they first felt the influence of art, unless by the help of art the beauty of the world could be brought within their reach. The masses required more interesting recreations for their leisure time. Till then he did not think any great change would take place in the way they spent their time. The speaker concluded by urging that the work should be undertaken by all who desired the welfare of the working classes of the country.

Mr. Judge (in the unavoidable absence of the author, Mr. Hodgson Pratt), read a paper on the same subject, strongly advocating the opening of museums and art galleries on a Sunday.

The President having invited discussion,

Mr. Statham said they must have been struck with the exceedingly practical way in which the question had been handled by Mr. Horsfall's paper. There was one idea in his paper which was also touched upon in that of Mr. Pratt, and that was the great effect of bringing objects of art before the people as a means

of cultivating their taste. With regard to the remark that a knowledge of art was necessary to the cultivation of religion, he suggested that the two things might go together. History might be quoted against them to show that the most artistic periods were the most immoral that ever existed. Why, he could not say. They heard a good deal of affording the people the sight of well-shaped objects, but, he asked, how were they to decide what were well-shaped objects and what were not? It could only be done by people accepting a certain style as to the right thing. He strongly advocated the cultivation of a moderate knowledge of drawing. Nothing would be of so much influence as increased facilities for the teaching of drawing in primary schools.

Mr. Hill, in stating his objection to the opening of museums on Sundays, said it would have been desirable if the question had been put down on the paper. His objection was that the Sunday opening was not necessary. Working people had been able to obtain the Saturday as a half-holiday, and one great argument in favour of the half-holiday was that the museums, &c., were closed on Sundays. Supposing tney were open on Sundays, employers would say "You can go on Sunday to the museum. You don't need to leave work." Working men felt that if the museums were opened on Sundays they would be inflicting injuries on the masses of the people. Taking Nottingham, for instance, would any one say that any considerable number of people could not on the week-days avail themselves of the opportunities given them for the inspection of art-treasures? He argued that the feeling of the working classes was wholly against the opening of museums on Sunday.

The President drew Mr. Hill's attention to the fact that the question raised by him was a merely accidental one, and not the question under discussion. He would ask him to be as curt as he could on the question of Sunday opening, and touch upon the influence of art upon the people.

Mr. Councillor Jacoby inquired whether, if the question of Sunday opening were discussed, he would have the right of reply.

The President had no objection to the speaker making remarks on the question when the previous speaker had done.

Mr. Hill, resuming, thought the question should be fairly ventilated, as there were two papers on the subject. Why, he asked, should they stop at the opening of museums on Sundays? Why should not the Crystal Palace be open? (A Voice: It is.) Why not the Polytechnic, the opera, the theatres? Our day of rest would be like what prevailed on the Continent. That was the tendency of the movement.

Mr. Councillor Jacoby said that having made the Sunday question his own, and having brought it two or three times before the Nottingham Town Council, he could not allow the remarks of the last speaker to pass unchallenged. All who endeavoured to make museums popular with the working classes found that Sunday was the only day on which they could go to institutions of that character. They found that they had most leisure on the day that they left off work. As to employers endeavouring to rob the working classes of the Saturday half-holiday, he would leave the trade unions to look after that. In regard to their own Castle Museum, the attendance had exceeded their most sanguine hopes. In Manchester the experiment of opening institutions of this kind on a Sunday had been attended with the greatest success.

Mr. T. C. Hine urged that an improvement in street placards would tend to the cultivation of beauty. In regard to the two papers which had been read, the object was to show how the love of the beautiful could be influenced for good.

Mr. Rathbone strenuously advocated the opening of museums on Sunday, from that being the only day the working classes could enjoy them. He contended we had no right to close museums to that portion of the working classes who made use of them. He ridiculed the objection raised by Mr. Hill as the eternal "thin end of the wedge." The answer in this case was very simple. If it were asked, If we are to open museums, why not shops? the reply was that the majority of the nation desired a day of rest. If one man opened his shop on Sunday it would necessitate other men opening theirs. The minority would, therefore, force the majority to do what they wished. There was no compulsion in the matter of the opening of museums. Those who did not think it right need not go.

After some remarks from Mr. Wright, who advocated the development of illustrated newspapers,

Mr. Horsfall moved "That this section recommends that the Council request the Science and Art Department to seek to acquire the power of preparing and of selling at cost price to persons or societies interested in education, representations of trees, birds, and other beautiful natural objects, good in respect both of fidelity to nature and of artistic quality."

Mr. Judge, who seconded the motion, spoke warmly in favour of Mr. Horsfall's paper. He contended that if the influence of museums was good it should be extended as wide as possible, and that it was not sufficient that they should be open to working people on Saturday afternoon.

Mr. Horsfall, briefly replying to the remarks made, said he did not say that a knowledge of art was necessary to religious feeling, but people could not be expected to have healthy and just feelings unless they gained knowledge through art. He did not think it possible for people to form an idea of the utter ignorance which prevailed among working people as to healthy views of life.

The President, in a few closing remarks, said it was of the highest importance that we should endeavour to give to every person as much pleasure as possible in the walk of life which he had to fulfil. He thought we could do a great deal more. We must devote a certain portion of our time to earn our living. We might reduce that, and he hoped to see the time when a similar portion was devoted to art. It was very important that young persons should have their eyes cultivated to perceive forms of beauty. The Greeks, who were the greatest artists the world ever saw, took the greatest possible care that people should be surrounded with objects of beauty, and he thought we should do more in that direction. There were few objects in nature which caused repulsion. In conclusion, the speaker suggested that we might combine pleasure with utility by teaching children to draw simple things they saw before them.

THE PRESERVATION OF LIFE AND HEALTH.

SANITARY INSTITUTE AT NEWCASTLE-UPON-TYNE.

THE address of Captain Douglas Galton, C.B., as President of the Congress, contained a large number of valuable facts, and deserves the greatest consideration. The host of congresses which are being held at the same moment makes the space scanty that we can afford it. We print, however, a small portion of it towards the close:—

The death-rate affords to some extent an index of the disease-rate in the community. It is, however, very difficult to ascertain with any degree of accuracy the disease-rate of a community, as compared with the death-rate.

If we take the army as a criterion, it would seem that there are more than a hundred men admitted to hospital to one death, whilst the number constantly sick averages from four to six times the number of deaths. No doubt in the army many an ailment has to be treated in hospital which in ordinary life would allow the sufferer still to pursue his vocations.

The sickness of the population is not registered, and it is very difficult to obtain any data respecting it. It has been generally stated that there are on an average twenty cases of sickness to one of death, of which four cases out of five are of children. I find, however, from a return of an unsanitary district in St. George's-in-the-East, that with a death-rate of 31 per 1,000, the sickness-rate was 270 per 1,000, or nine cases of sickness to one death. But in the worst parts of the same district the sickness-rate amounted to 620 per 1,000, which gives twenty cases of sickness to one death.

Mr. Neison, who has recently examined the records of the Ancient Order of Foresters, shows that at thirty-five years of age there are on an average twenty-two cases of sickness to one death, and that is in a body of men which it must be borne in mind are selected men so far as health is concerned. From the same record we find that at twenty years of age the loss of time from sickness amounts to 1·5 per cent. of the whole time; and at forty years of age it amounts to 2·6 per cent.

The value of a single premium paid at 20 years old (calculated on the 3 per cent. tables) to insure 1*l.* a week during sickness, for the whole life, is 40*l.*

I sought, but failed to obtain, definite statistics on this subject from some of those who are working amongst the poor, both in the east and west end of London.

An East-end clergyman remarked that "the poor go on living wonderfully in wretched places, but that they have so much ill-health. They are perpetually on the trudge to the hospitals with their bad chests and bad legs, and get patched up again and again, and live on." Our London hospitals and dispensaries cost, according to Mr. Burdett's statistics, nearly 600,000*l.* annually to administer. The average number of out-patients treated at the various institutions in a year is about 1,000,000,—that is to say, more than one out of every four inhabitants of the metropolis becomes an out-patient in the course of the year.

This expenditure is incurred mainly for the purpose of patching up the wretched poor, who have been injured by bad drainage, want of ventilation, darkness, &c. Though drink may be one of the immediate causes of many hospital cases, yet the tendency to drink is created and fostered by the wretched dwellings of the very poor. But besides the time lost by the sickness itself, there is the large amount of time wasted by the poor in going to and waiting at hospitals, which would be spent by healthy poor in labour.

There is, moreover, the great amount of lassitude and idleness in the low-class poor, which Dr. Richardson traces to want of ventilation, in their own and former generations.

I think we may safely assume that if you can, by preventive arrangements, bring down the death-rate of the wage-class to the standard afforded in good sanitation, you would reduce the sickness-rate in a similar proportion at least. By means of this item alone the wage-earning power of the industrious classes would be enlarged by some millions of pounds, and their comfort correspondingly increased.

You would effect, in addition to the savings under this head, certain other distinct economies. For instance, it is certain that the need for much of the accommodation in our prisons, reformatories, and workhouses arises from evils incident to unhealthy circumstances and crowded dwellings.

We shall probably be led to appreciate more fully the advantages of good sanitation if we can arrive at putting a money value upon some of the more direct results of sanitary improvements.

In the first place, the community derives a direct advantage from adopting such a system for the removal of refuse as will enable it to be applied directly to improving the cultivation of land. For whilst, on the one hand, the rapid removal of refuse from the neighbourhood of dwellings by the efficient sewering of towns results in improved health, the application of sewage to land by the irrigation of growing crops affords both a means of fertilising the land, and of cleansing the fluid, so as to place it in a fit condition to pass into the streams.

My friend Mr. Chadwick asserts that where the sewage is undiluted with rain-water, and where it is utilised at once, and carefully applied under favourable conditions, an acre of land ought to absorb the sewage of 100 persons, and that the crops on this area should feed five cows; or, if put in another way, that the produce of ordinary cultivation being represented by 1, and market garden produce by 3½, the produce of sewage cultivation should be represented by 5.

I have obtained some recent facts on the direct application of sewage to land which, although they do not show such high results, deserve attention.

Mr. Brundell, who has the management of the Doncaster Sewage Farm, states that during nine years he has never applied any other manure than sewage. That this year the crops are the heaviest that have been produced, and the land remains just as capable of receiving the sewage as it ever was, and does not "tire." Mr. Collett, of the Bedford Farm, says that their produce is generally much above the average of the neighbourhood, and that the crops are as good or better than they were seven or eight years ago; and the land under sewage treatment has improved in quality. . . .

In the next place, the diminished death and sickness rates, and the greater length of life entailed by good sanitation, afford direct pecuniary advantages.

Let us apply this reasoning to the population of the improved artisans' dwellings in London. These now accommodate about 11,000 families.

In many of the districts which are now covered by these improved dwellings, the death-rate in the wretched homes which have been removed varied, as I have told you, from 35 to 40, and even 50 per 1,000. Mr. Gatliff shows that there are nearly five in a family, on an average, in model lodging-houses. There has thus been a saving of life to the extent of at least 20 per 1,000, by the erection of these dwellings, on the 50,000 persons inhabiting them, or about 1,000 deaths annually. And if we take the estimate of sickness which I arrived at above, there would be a reduction in the number of cases of sickness which occur in the population of these dwellings of at least from 15,000 to 20,000.

The cost of the improved dwellings appears to have averaged a little over 170*l*. each, or about 1,900,000*l*. for the 11,000 families.

By the light of these various data we may obtain some idea of the actual pecuniary advantage to the community which results from the improved health of the occupants of such dwellings. The cost of funerals has been stated to average 5*l*. apiece. Under this head, therefore, the saving may be taken to average 5,000*l*. a year; the diminished loss of the sickness of the 11,000 heads of families alone may be assumed to average another 5,000*l*. a year; and in addition to this there would be the saving in time and money, in seeking medical attendance, of the wives and children who make up the remaining population of the dwellings, as well as the increased power of earning wages afforded to the mothers of families from the diminished sickness of the children.

Hence the money benefit to the community thus made up, which is caused by the diminished death-rate and sickness-rate, would form an appreciable item in the percentage of interest paid on the 1,900,000*l*. capital expended in the construction of the dwellings.

But there is another way in which we may estimate the economy to the community resulting from the increased health which has been obtained in these dwellings.

The analysis of the mortuary rates for Westminster showed that the mean age at death of the males of the wage classes in Westminster, who had survived the period of youth, and died after 20, was 47·6 years.

The rate of mortality in the Improved Dwellings is from 14 to 16 per 1,000. The rate of mortality in the rural parishes of Northumberland above mentioned, in the years 1877-81, was 15·3 per 1,000; and in Dover in 1880, it was 16·7 per 1,000. It will not be unfair, therefore, to take the mean age at death of the males who died over 20 in the rural parishes of Northumberland and in Dover as a standard, which may be reasonably expected, for the duration of life of the males who die over 20 years of age in the Improved Dwellings. This was, for the rural parishes of Northumberland 60·9 years, and for Dover it was 57·8 years. That is to say, from 10·2 to 12·3 years, or a mean of 11 years additional duration of life may be expected for the heads of families occupying the Improved Dwellings, beyond that enjoyed by the wage classes who do not live in such favourable surroundings.

Therefore, we may assume as a profit to the community the increased earning power of the occupants of these dwellings, due to this increased expectation of life. It would appear from Mr. Neison's tables that six per cent. would be a full average deduction for sick time between 47 and 58 years of age; and we may, therefore, safely take the increased earning power as that due to an additional 10·4 years of life.

If, in order to form a rough estimate of the money value of this, we assume that each of the heads of the 11,000 families receives as a present on his admission to the dwellings a grant of ten years more life, and calculate its money value on the earnings of only 1*l*. a week, we find that upon a four per cent. table the present value of ten years of increased wage earning power at 1*l*. per week would be for 11,000 heads of families 4,640,000*l*., or nearly two and a half times the cost of the property.

By considering the question in this way, we arrive at an understanding of some of the direct pecuniary advantages which accrue to the nation from those sanitary improvements which lead to a decreased death-rate and sickness-rate; and we see that, however large may be the cost of the removal of bad dwellings, and the substitution in their place of healthy well-planned dwellings, the actual money gain to the community far exceeds the expenditure in money.

But it is not as a money saving alone that the question must be considered. Its social and political bearings are even more important.

The nation is made up of individual items. The goodness and the happiness of the nation depend upon the individual. Well-regulated family life does more to make up individual happiness than any other form of life. But family life is impossible in the wretched homes which have been permitted to exist in most of our large towns, and many of our rural parishes. These wretched homes drive the population into the streets, and into the gin-palaces, and into the public-houses. They engender sickness, which entails poverty, and they foster crime.

The improved dwellings, on the other hand, ensure improved health, and by thus affording a security for the more continuous earning of wages, create the possibility of a comfortable home. I was much struck, when in the United States of America, with the fact that the artisan and wage classes, in many manufacturing towns, lived in very comfortable houses, in which each family had their parlour, with appropriate furniture, pictures, and often their piano. They had come to look upon these things as a necessity; and this is an evidence of the general civilisation which pervades American society. By civilisation I mean the education and the general well-being of all classes.

In this country our most advanced sanitarians have long endeavoured to impress these doctrines on the public, and I am happy to think that at last they are beginning to bear some fruit; for, in order to develop morality, contentment, and happiness among a people, it is essential that they should be provided with healthy and comfortable homes.

HEALTH QUESTIONS AT THE NOTTINGHAM CONGRESS.

THE Health Department of the Social Science Congress at Nottingham was presided over by Sir Rutherford H. Alcock, K.C.B., who, in the course of his address, said he doubted if there was a word in the language of so deep a meaning as the word "health." On it depended not only the duration of human existence, but the power of active exertion and enjoyment, often more highly valued than life itself. "Health" was a term difficult to define, but for all practical purposes, however, they might, perhaps, be content with knowing that it implied a state or condition which allowed full play to all the organs and component parts in due subordination and harmonious action. Yet few precious things were so persistently neglected, so rashly imperilled, or so wantonly thrown away. And as regarded whole nations or communities, few objects of public interest met with so little attention. How was it that the history of all sanitary progress in this country was that of a continuous struggle against prejudice, ignorance, and vested interests, separately or collectively opposed to the measures best calculated to safeguard and promote the public health? The antagonistic forces to be met were not difficult to define, and they might be ranged under a few heads. Putting aside such exceptional cases as those of the Peculiar People or the Anti-Vaccinationists, they might reduce the ranks of the opposing force to those who objected to the sanitary legislation required, either on the ground of a distrust in the power to effect any material change in the average mortality, which they believed was regulated by laws beyond man's control, or on the ground that any compulsory legislation would be an undue interference with the personal liberty of the subject or the rights of property and vested interests. The liberty of the subject had always been used as the stalking-horse of the opponents of reform and improvement, and might be pleaded for the liberty of carrying a lighted torch among neighbours' hay-ricks, or an open lamp in a coal-mine, or smoking a pipe in a powder-magazine, or, in fact, any other act of insanity or recklessness, to the imminent danger of a whole community. In itself it was an argument of little value. So long as the health or life of an individual alone was concerned, as in diseases which were neither infectious nor contagious, each one might claim some large discretionary right to decide whether either the one or the other be worth preserving, and refuse to the State or to others any power of deciding. But even as regarded that the State did assume, in the case of suicidal acts, both the right and the power to interfere with the individual. But it was a wholly different matter when a person was attacked by an infectious and death-spreading disease endangering the health and lives of others, and the interests as well as the safety of a whole community. The adoption of compulsory measures of isolation and disinfection became then an act of self-preservation and public policy which no pleas of public liberty could be allowed to stand in the way of, or otherwise prevent the most prompt and effective action; for the multiplication of centres of infection gravely compromised the health and lives of a whole community, and with it the wealth and prosperity of the country. Mr. Edwin Chadwick had recently told them that he always found in his local inquiries that the seats of epidemic disease—the results of bad sanitary conditions,—were the seats of irritation, of disturbance, and of crime. The indissoluble connexion between the physical and moral law was fully demonstrated in the origin and progress of epidemics. A population crowded into dilapidated houses, ill-drained and ill-ventilated, not only grew feeble and enervated, and predisposed to receive infection, but by the same process they became demoralised in body and mind, and dangerous subjects. Mr. Chadwick, dealing with the economic aspect of the question, in his paper read at the meeting of the Association in Dublin last year, said that the total loss to the wage-earning class by the loss of work through sickness had been estimated by Dr. John Watts, who had had great experience in friendly societies, at 13,000,000*l*. in the course of a working man's life, and referred to the report of the Local Government Board for 1880-81, in which it was stated that the death-rate of England and Wales had fallen during the last decade by nearly 4½ per cent., showing by a rough estimate that about a quarter of a million of persons were saved from death who would have died if the death-rate had been the same as in the previous thirty years. Thus, if twelve cases of serious but non-fatal cases be reckoned for every death—and the early estimate was greater,—it followed that about 3,000,000 persons, or over one-ninth of the population, had been saved from a sick bed by some influence at work in the past decade, which had not been in operation previously. As regarded our Navy and Army, which cost us about one-third of the whole revenue raised by taxation, it would be found that far more were struck down by sickness than fell by the sword. There was to be found within seventy-four pages of the Registrar-General's annual report, condensed in tabular form, a record full of instruction and of absorbing interest, giving the sum of all the ills to which the flesh is heir from disease or violence. In looking over those returns he could not but come to the conclusion that though many of those ills were irremovable, others were certainly preventable. Of the first class, at the head, stood endemic diseases, or those peculiar forms of disease which arose spontaneously, as it is termed, in a country or particular locality, of which goitre in mountainous countries was perhaps the most striking example, existing, as it did, in every quarter of the globe where mountains were physical features, and the ague in all marshy countries, and the plica in Poland. Yet sanitary science could materially alter these, and so effect what medicine could not. Cesspools and sewage might be removed, and sewers might be ventilated and flushed, and all the foul and deadly gases generated in them diverted from inhabited houses by trapping and other means. But placed at the head of all the specified causes of death, were those of the zymotic class, that is, diseases which prevailed among a large number of the people of a country, raged for a certain time, and then gradually diminished and disappeared to return again at periods more or less remote. From that group came all the epidemics from which we suffered from time to time. The whole group constituted a class of

diseases which might be distinguished as essentially preventable. Upon the cardinal point of the power of isolation to arrest the spread of infection the evidence was absolutely unanimous, showing that such isolation almost invariably answered its purpose. In order to insure such isolation, legislation was needed, and the compulsory notification and isolation of those infected must form essential provisions of any effective legislation. Nothing short of this could suffice.

One of the special questions for discussion was, "What Reforms are desirable in the administration of Hospitals?" Dr. T. Gilbart Smith read the opening paper, in which he indicated many changes which he deemed to be desirable, and said that, having regard to the complications and difficulties which surround this question, and to the necessity for efficient reorganisation, there could be but one opinion, namely, that a full, wide, and searching inquiry into all its bearings can only be obtained by the appointment of a Royal Commission.

Mr. F. S. Powell moved, and Dr. Cameron, of Dublin, seconded:—

"That this department, deeply convinced of the necessity of reform in the administration of metropolitan hospitals and other institutions for the medical treatment of the sick, requests the Council to continue their exertions to obtain the appointment of a Royal Commission, with the view to obtain reliable data upon which reforms should be based, and make such recommendations as may appear desirable."

After some discussion the resolution was put and carried.

Sir J. Pope Hennessy made a short statement on the Chinese system of collecting sewage and placing it on the land. The advantage was the freedom of the Chinese from typhoid and the diseases generated by sewage-gas. The disadvantage was that it was not pleasant to be in the fields at the time the nightsoil was being distributed. A conversation followed, in which Dr. Little, of Liverpool; Mr. Tarbotton, of Nottingham; Alderman Ford, of Nottingham; Dr. Hill, of Birmingham; and Sir R. Alcock took part.

Smallpox epidemics, as affected by the states of war and peace, were discussed in a paper by Dr. William A. Guy, F.R.S. A series of curves accompanied the paper, in which the leading facts were represented; and attention was specially directed to the figures and curves of the years 1796 and 1871,—years in which Paris (our near neighbour) was suffering from the worst effects of war, aggravated by domestic discord. War was rather an aggravation of evils already existing among the peaceful populations from which its fighting men were drawn, than a thing altogether *sui generis*. The progressive decrease of mortality by smallpox, so characteristic of the nineteenth century (for no such decrease had occurred previously) was not occasioned by the transition from war to peace, but it began in the years of war, and continued during the years of peace. As the seventeenth and eighteenth centuries afford no other example of a decreased mortality so progressive and so considerable, we are forced to conclude that some new and powerful cause, or combination of causes, acting continuously and with ever-increasing force, must have come into operation in the early years of the nineteenth century. Vaccination replacing inoculation, and extending its protective influence to an ever-increasing section of the population, is the only force which fully meets the conditions of the problem.

DAVOS-PLATZ.

THE Frauenkirche at Davos has little to mark its date except an apsidal east end. The body of the church is said to date from 1240, and the miniature tower and wood-shingled spire of the same date yet remain at the north side.

About 1560-70, *i.e.*, some years after Zwingli's thunder at Zurich, a large tower with shingled spire was added, and forms the only architectural feature of value in the landscape of this Alpine valley. In point of size it is out of proportion to the little church of which it forms now a part, and was probably built to mark the final freedom from Austria of the little Davos district.

I must call attention to the beauty of the spire. It is not twisted bodily like Chesterfield and some on the Continent, but has to each face a singularly graceful surface-spiral, or, rather, portion of one. In colour and texture of shingle it is equally beautiful. Tower and spire together have a certain Rhenish character, mainly produced by the steep gables which terminate the tower walls.

There are two bells, one 3 ft. 3 in. diameter, the other 4 ft. 3 in. The latter is a tenor of singularly fine tone, cast at Poschiavo in 1681, as its inscription testifies, "Pavio Antonio Gaffori *von Pushlof*." It bears also the arms of Davos,—a species of Robinson Crusoe with a spiked Swiss club.

The name of Buol occurs in Davos history in the sixteenth century, and a descendant of the family still keeps the hotel which bears his name.

The place itself is 5,105 ft. above sea level, with a singularly fine, dry, clear, bracing, atmosphere, and is becoming a great winter resort for invalids. Seeing what a harvest Death the Reaper has lately garnered of the leading English architects, I commend it as a holiday resort to those who survive.

EDWARD ROBERT ROBSON.

Innsbruck.

BISHOP STEERE.

As one who knew the late Bishop Steere intimately from the time we were schoolfellows together, and as one deeply interested in the new building called the Cathedral at Zanzibar (the bishop always called it "Christ Church"), having made all the designs for it myself, I feel impelled to add a few words to the excellent statement of his life and work which appeared in the *Times* of the 19th inst. The bishop is there spoken of as a "bold man" because he was his own architect, and it is added that he felt himself equal to the task. I think I alone can fully appreciate this, inasmuch as the bishop came to me as to an old friend with his original ideas, and, bringing his crude sketches with him, asked me to undertake the task of designing the building therefrom, putting the whole into a proper architectural form. This was done, and, therefore, the boldness referred to was less than the wisdom which sought and accepted help in the form which was needed. Subsequently, the bishop himself superintended the whole of the work on the spot; had put together, under his own eye, the centering for the vaulted roof which I had caused to be made and sent from England, as well as the marble work for columns, &c., stained glass for windows, font, and altar-piece of marble and mosaic.

These sketches I have referred to were no surprise to me, as we had gone together in small church-hunting excursions many years ago, he studying the glass and such internal details, while waiting for the conclusion of my architectural study of a building, neither of us dreaming how, in after-life, such studies would blend together in forming a distant edifice,—a church on the slave-market at Zanzibar,—and scarcely less so when, on his first appointment to the living of Little Steeping, he called on me to build his parsonage, and subsequently the schools, after his first visit to Zanzibar.

C. FORSTER HAYWARD.

PROPOSED TIDAL BATHS AT BRIGHTON.

AT the meeting of the Brighton Town Council, on the 20th inst., the Works Committee submitted a special report with reference to the improvement of Madeira-road (the road which skirts the beach at the foot of the Marine Parade). It comprises a report to the committee by the surveyor, a recommendation, a form of advertisement, and particulars of the proposed improvement. The report of the surveyor (Mr. Philip C. Lockwood) says:—

"In pursuance of your instructions I beg to submit to you herewith a plan of the beach and foreshore from East-street to Black Rock, with reference to the improvements which have been suggested on the Madeira-road, and in so doing I wish to point out that, in addition to the proposed improvement between the Chain Pier and Paston-place, it is also very desirable that the base of the slope at Duke's Mound should be defended by a sea-wall extending from the groyne opposite Paston-place to the Kemp Town slopes, and that the lower roadway should be extended from the north end of the concrete groyne to the gap at Black Rock, as proposed by me in 1872, a plan of which I also present herewith."

The committee recommend that premiums be offered for designs for the erection of Public Tidal Baths for men and women, with suitable adjuncts and conveniences, embracing tepid swimming-baths and private baths, on the beach, off or near Atlingworth-street, and that the premiums be 200*l.* for the best design, 100*l.* for the second, and 50*l.* for the third. The committee also recommend that the form of advertisement and draft conditions for the competition, appended to their report, be approved of and adopted. The form of advertisement states that the Town Council desire to improve that part of the sea frontage called Madeira-road, extending from the Chain Pier to the concrete groyne opposite Paston-place, by the erection of public tidal baths, with terraces, sheltered seats, summer-houses, and other public conveniences, and invite architects and engineers to give designs for this purpose. The drawings and designs to which premiums are given are in each case to become the property of the Town Council, who will not be bound to employ any competitor in or about the executien of the work, or otherwise, nor to make any payment with regard to any of the designs, except the three premiums above mentioned. The designs are to be sent to the town clerk on or before the 1st day of February, 1883. Particulars, for the information of engineers and architects sending designs, are also appended, and from these it appears that the baths are to embrace a tepid swimming-bath with a water area of about 200 ft. by 50 ft. for men, and a swimming-bath, with about half that water area, for women; about fifty private baths for men and thirty for women, and suitable adjuncts and conveniences. Careful arrangements, the particulars continue, must be made for filling and emptying the baths, and for heating them without making smoke. Ample public conveniences for men and women, and spacious places for promenade and recreation, should be provided in connexion with the baths. It is not intended to make provision for shops or for the sale of goods, but only for the sale of newspapers, light literature, and refreshments; and there should be accommodation for attendants. It is also proposed to construct such other terraces, promenades, embankments, summer-houses, sheltered seats, grass slopes, or the like, as may be conducive to the improvement of the roadway as a place of public resort, and to the pleasure and comfort of visitors, and the designs are to show the best means of approach from the Marine Parade and other adjacent roadways to the site of the propcsed improvements.

The report of the Committee was adopted.

EXTENSION OF THE BRITISH MUSEUM.

ON Saturday last the corner-stone of a block of buildings connected with the south-eastern side of the British Museum was laid by Mr. Edward A. Bond, Principal Librarian, in the presence of the chief officers of the Museum and others. Mr. Bond took advantage of the occasion to make it known that the new buildings, consisting of a frontage to Montague-street of 120 ft., with two sides carried up to the museum walls, were being erected from funds bequeathed by Mr. William White, a gentleman who had resided in the neighbourhood, and who, at his death, in the year 1823, left the reversion of a sum of 63,941*l.* to the trustees of the British Museum, to be used at their discretion, but with the expression of a hope that it would be expended on an extension of the Museum buildings. The actual terms used by the testator are as follow:—

"The money and property so bequeathed to the British Museum I wish to be employed in building or improving upon the said institution; and that round the frieze of some part of such building, or, if this money is otherwise employed, then over or upon that which has so employed it, the words 'Gulielmus White Arm. Britanniæ dicavit 18—' be carved, or words to that import. It is a little vanity of no harm, and may tempt others to follow my example, in thinking more of the nation and less of themselves."

The bequest fell in early in the year 1879. By payment of the legacy duty,—rigorously exacted by the Government,—it was reduced to 57,572*l.* Of this sum about 11,000*l.* has been expended in the erection of a new gallery for Greek sculptures, between the Elgin and Assyrian galleries, and in other works connected with it. The remainder is now being spent on the new block of buildings. It was further explained that this would give accommodation on the ground-floor for the rapidly-increasing collection of newspapers, which has outgrown the space

designed for it in the library, together with a convenient reading-room in which they could be consulted, and, on the two upper floors of the front and north side, rooms for the department of prints and drawings, with space for exhibition.

The plans of the building have been furnished by Mr. John Taylor, surveyor to Her Majesty's Office of Works; and the contractors are Messrs. John Mowlem & Co. It is expected that it will be completed within about twelve months from the present time.

THE SANITARY CONDITION OF BERLIN.

THE question of sanitary reform has long been a prominent one in technical and official circles in the capital of the German empire; but an opportunity has now presented itself of obtaining a ready insight into the progress really made in that city. This is afforded by Dr. Skrzeczka's report to the Imperial Government, from which it appears that much work of a really useful character has been done at Berlin of late. Party differences and occasional diversity of views between the state officials and the municipal authorities have been merged in the successful efforts to promote the health of the population.

The purity of the air has occupied attention, with special reference to the necessity for new building regulations, framed with a due regard to the exigencies of the public health. According to the estimate of Herr Böekh, the population of Berlin is more numerous, in proportion to the ground covered by the capital, than is the case in any European city. It is remarked by the *National Zeitung* that this evil has increased of late, and has had a direct influence upon the spread of epidemic diseases. The unfavourable situation of Berlin, together with the unsatisfactory condition of the dwelling accommodation in many parts of the city, exercise a combined effect upon the mortality amongst children in a special manner.

The efforts to find better sources than heretofore for the drinking-water of the population, and the due carrying out of the filtering arrangements, have been matters of special moment to the various administrations affected.

There seems to be a general opinion that the system of drainage introduced into Berlin of late years has exercised a beneficial effect upon the public health. The frequency of the occurrence of typhus fever is usually considered a reliable standard for estimating the sanitary condition of a city. The report of Dr. Skrzeczka points out that the result of the adoption of drainage in certain districts was a progressive improvement of the health of those portions of the capital and a gradually decreasing number of typhus cases.

THE GENIUS OF SIR CHRISTOPHER WREN.

SIR,—A letter appears in the *Builder* of September 23, signed "Andrew T. Taylor," commenting on some points in my recent paper on the genius of Sir Christopher Wren; but so void of argument and so uncourteous that, but for fear my silence might be misconstrued, I should leave it unnoticed.

In his haste to contradict me, the writer mistakes and misrepresents my meaning in the passage he refers to. The doubt I expressed in reference to Wren was whether he possessed, in strength of imagination, higher resources and inspiration than what geometry yielded him; not whether he had power to design independently of his geometrical resources, which no man has; and my object was to suggest that geometry is not the only fountain of architectural beauty,—that architectural designing is something higher than a geometrical operation, or the construction of regular solids,—and that, though based on geometry, architecture can soar into the pure haunts of imagination.

I now contend that though the great majority of architects do not conceive graceful architectural forms independently of, or beyond, their geometrical resources, the man who cannot do so is not, in the high and true sense of the word, an architect, imagination being the vital quality in all art-work.

I have only to add that Mr. Taylor's quotation from the late Mr. G. E. Street, R.A., whatever it may be to his own mind, is by no means conclusive to mine; and, as Mr. Street had no monopoly of critical judgment, I take the liberty, without the least feeling of disrespect to his memory, to differ from him on the subject; and whether the failure of the steeples in question has been acknowledged or not, to reassert it on my own responsibility. The very natural and touching remarks of Mr. Street in his address to the Institute are, however,—rightly read,—but little at variance with my position. Whether I am right or not can only be judged by those few who are capable of designing or imagining superior compositions of the class. To those few I appeal. Wren's steeples will doubtless be perfection to him who can see nothing higher and brighter beyond them.

SAMUEL HUGGINS.

PROPORTION IN PRACTICE.

SIR,—The series of papers which have lately appeared in your journal on the subject of proportion in architecture are specially valuable in the light of present-day practice. With the revival of the picturesque in architecture and the extent to which it has been developed, there is a tendency to value it exclusively for its own sake, and to ignore the just and fundamental claims of proportion. It is difficult to define what proportion is, and much injury has been done to the cause of good architecture by propounding theories which are purely mechanical in their basis. Excellence of proportion is the result of many qualities; it will commend itself to the intellectual and æsthetic faculties, and therefore be the product of both combined, and not of either separately, but the result of this combination must in turn be tested by experiment and practice. Hence an advantage in studying good models of the best styles of architecture, so that we may, if possible, ensure some advance on what has been already done. Much good work is being accomplished in this direction; old forms with their refinements are recombined and reproportioned, new creations of beauty are the result. But danger may arise from satiety; even good forms repeated are apt to pall on the mind; when that occurs, there is then a tendency to change their proportions with a view to new effects. This is sufficiently evident in much of modern practice, and, while regrettable, is in a certain measure excusable. The architect has a story to tell, and prefers to do so in his own way, and it may, though crude, lead perchance to fields and pastures new, and, provided it does not violate good taste, be accepted with thankfulness as a new rendering in art.

Modern practice is diffuse, and the cases are rare where a man devotes himself to one branch of architectural art, each succeeding effort surpassing that which went before. Even assuming such a case, it would require to be multiplied by many contemporaneous instances, as no one mind is capable of eliciting the whole truth; it must be the work of several, each sharing with each that aspect of it which commends itself to his own individuality. We can never again have that unity of architectural effort which characterised what men are pleased to call the Dark Ages.

It has been the theory of many people that geometrical proportion pervades the architecture of those times, and your esteemed correspondent, Mr. Cave Thomas, alludes to it in your issue of the 16th inst. [p. 383, *ante*]. But as this subject is an interesting one, and may be regarded from another standpoint, I venture to say that in the various qualifying circumstances with which actual practice is invested, the theory becomes of doubtful applicability. Take some normal architectural form, something possessing unity, and which may have been operated on by various minds during many generations, and therefore likely to embody the quality of good proportion in its fullest measure,—the Gothic cathedral, for instance.

Imagine, in the first place, each part of that edifice a gem of art, carefully related in height, width, and detail; this accomplished, take the next step of uniting these parts together, and you have, up to that stage, a merely mechanical combination. Something else is required to encompass it within a higher principle: it may be desired to impart the attributes of dignity, aspiration, or mystery, but all these elements are so far independent of good proportion that their evolution may require the modification of those proportionally-related parts.

Besides all this, the effect of a building is modified by the standpoint of a beholder, so that what might be satisfactory in one aspect may be quite otherwise from another. Foreshortening, with its transmutations, for instance, is a condition which must be taken into account. Or again, the whole effect of a building may be changed by the nature of its situation; and, be it peaceful valley or rugged hill, proportion will inevitably need adaptation to different surroundings.

Is Mr. Cave Thomas right in severing construction from art in its claims on proportion? May construction in satisfying the judgment not also gratify the æsthetic faculties? The flying buttress is essentially constructive, and, withal, one of the most beautiful conceptions of Gothic art. Even the factory chimney referred to has its latent capacity for development into good, if not graceful, proportion. Moreover, the material we have to deal with may further demonstrate this view of the case. If a column be of iron we adopt an entirely different ratio of diameter to height than in the instance of stone, and either of these two modes of construction will satisfy the taste and judgment of any person cognisant of their respective qualities.

If there be, therefore, any connexion between construction and art, it seems reasonable to expect that by satisfying the claims of the one the interests of the other are not neglected.

G. S. AITKEN.

"WHAT IS PROPORTION?"

SIR,—Your correspondent, Mr. Cave Thomas, [p. 383, *ante*] in dealing with this subject, concludes very justly that "every quantitative relation, every proportion, good, bad, or indifferent, is mathematical, and every configuration of surface and every form of solidity is geometrical," and in consequence that constructive fitness need not of necessity be symmetrical. He apparently overlooks the difference between *aliquant* and *aliquot* proportion. During a practice of thirty years as an architect, I have given this subject considerable attention, and have found that well-proportioned rooms, for instance, are only to be obtained by the following rule of geometrical relation, which may be varied to any magnitude, taking the height as the standard of measurement:—

Height of room, 18 ft.	Length.	Width.
The cube	18 ft. ...	18 ft.
Cube and a half	27 ft. ...	18 ft.
The double cube.....	36 ft. ...	18 ft.
The subduple, 4, 3, and 2	36 ft. ...	27 ft.
Ditto, 5, 4, and 3 ...	30 ft. ...	24 ft.
Ditto, 6, 4, and 3 ...	36 ft. ...	24 ft.
Ditto, 3, 2, and 1 ...	54 ft. ...	36 ft.

All these relative proportions, and many others, varying with the standard height, produce what has been termed the harmonic proportions of rooms, and in practice, I have always found them satisfactory in construction. Writing on this subject more than a hundred years ago, an old writer says, "Nature has taught mankind, in music, certain rules for proportions of sounds, so architecture has its rules dependent on those proportions, or at least such proportions which are in arithmetical harmony; and those I take it to be dependent on nature. The square in geometry, the unison or circle in music, and the cube in building have all and inseparable proportion; the parts being equal and the sides and angles, &c., give the eye and ear an agreeable pleasure." The same natural law may be noted in the regularity of the progressive strain brought upon a lattice girder as represented by numerals, a regularity by which all the laws of creation are distinguished, and through which they have been interpreted by such men as Newton, Herschel, and Darwin.

The only means by which an accurate reproduction of the proportions of the old Classic temples of Greece and Rome can be obtained, is by quantitative relation. The diameter of the base, divided into modules and minutes, is the standard scale by which the depth and projection of the smallest member is regulated. Mr. Thomas may argue that the beauty which is the undoubted result of these proportions is the effect of custom, but if they had not been originally pleasing custom could never have established them at all.

Mr. Thomas dubs those who differ from him on this question as half-educated persons, but by these rules such buildings as the Parthenon are to be judged, and were applied before men

were educated up to the standard of Mr. Thomas's conception, and before the word æsthetic, as used in the modern parlance of the day, brought art into contempt.

I may add that the width of the windows has always been considered by architects as regulating the height on every floor. A good proportion for a window on the second floor is obtained by squaring the width and taking the diagonal as the height.

BYNG GIRAUD.

FROM BIRMINGHAM.

THE lighting of the Birmingham Town-hall for the evening performances during the Musical Festival was entrusted to Messrs. Winfield & Co., of Cambridge-street, and they adopted the Swan incandescent lamps fitted to cluster pendants of their own manufacture, arranged around the hall so that each pilaster above the galleries had on the sides of the hall a cluster of twelve lights, and on the ends of the hall a double cluster of twenty-four lights each. Lamps were also arranged in pairs under the galleries, and chandeliers in the committee and artistes' rooms, and an arc light of a nominal 10,000 candle power suspended over the entrances in Paradise-street. These all gave great satisfaction. The whole of these fittings the Messrs. Winfield now offer to the Corporation as a present to the town. The electricity was derived from some twelve Crompton-Burgin dynamo-machines, set up in the works at Cambridge-street about a quarter of a mile away, and transmitted through wires laid down in pipes through the streets to the hall. The firm now offer to supply the electricity to light the hall when required at the rate of 8*l*. per six hours for inside the hall, and 2*l*. per six hours for the arc lamp outside the hall, provided the Corporation purchase from them the pipes and wires laid down in the streets. These terms are generally considered onerous and excessive, and are some 40 per cent. more than the present cost of gas.

Another meeting of the Dawson Memorial Committee has recently been held, and an announcement made which has given great satisfaction in the town. The committee find themselves no longer able to contend against the almost universal convictions of the subscribers and the public as to the utter want of artistic merit in the present statue; and as it has been recently discovered that the figure was suffering from a broken nose,—done by a workman during its erection,—a fact which, to the writer's knowledge, has been an open secret ever since, they recommend that a new statue be obtained, and the present one removed. As a considerable sum of money remained in their hands after paying all expenses of the present statue, the contractor and the committee have made it up to 800*l*., a sum which Mr. Williamson is willing to execute a new statue for, and his offer is accepted. A very warm discussion is now going on as to the desirability of removing the very pointed Gothic canopy, and re-erecting that and the statue over the grave in the cemetery. The general feeling seems to be, that if the new statue is to be a standing figure, the canopy ought to be removed and the canopy cast in bronze; but if the canopy is to remain, then the figure may be of marble, but should be sitting. E. G.

ELECTRICITY AND VENTILATION OF BUILDINGS.

THE dynamo-electric machine has already been shown, in the able papers of Dr. Hopkinson, to be a most economic transformer of energy; in fact, there can be room for little improvement in a machine which, when used for heating or lighting, actually transforms nine-tenths of the power applied to it into actual work, exclusive of friction. By connecting the terminals of the dynamo-machine, to which power is applied, with those of a similar machine, a certain portion of the power can be re-obtained, independently of the distance between the machines. This power varies with machines of different construction. With the Siemens machine, which is particularly well adapted for the transmission of force to a distance, the best actual results seem to be 49 per cent. of returned energy. In ordinary cases the loss is too great for power to be transmitted in this matter, unless the original source is obtained for nothing, as in the cases of utilising a waterfall, or the rise and fall of the tide. Where the electric current is laid on for lighting purposes, as in a theatre or workroom, for instance, advantage may be taken of the application of the power by utilising it to work the apparatus for ventilation when not in use for lighting. The great drawback of mechanical ventilation hitherto has been the necessity of having a steam-engine. With the introduction of the electric current this will be got over, and wherever a building is lighted by electricity a means will be provided for thoroughly purifying and renewing the air when the light is not being used. More than this, it would be possible to utilise the surplus energy of the current supplying each arc lamp by causing it to work small electro-motors, placed either in the main or in the shunt circuit of the lamp; or, if several fans were to be worked, a special separate generator could be used. These motors would actuate small exhaust-fans fixed in the air-ways in the places hitherto found most difficult to ventilate.

The author has found by experiment that as long as the power thus taken off is practically constant, no irregularity is noticed on a light working on the same circuit. It is for this reason that it would be better to cause the fans to exhaust air rather than to supply under a pressure which might vary from time to time. Where a system of electric mains has been laid down, the introduction of power for the purpose of working every class of light machinery will become general.

Hoists can be worked, sewing machines, lathes, and looms have already been driven by small electro-motors, selling at the present time for about 30s. each and upwards, and which, from the absence of complicated working parts, will cost, for renewals and repairs, less than the oil consumed in the gas engine they are destined to supersede at an early date.

KILLINGWORTH HEDGES.

THE FALL OF A BUTTRESS AT ST. PATRICK'S CATHEDRAL, DUBLIN.*

THE inquest on the bodies of the three persons who lost their lives by this disaster was resumed on the 21st inst.

Mr. R. M. Carnegie, in answer to the Coroner, said,—I am verger in St. Patrick's Cathedral. I was standing in the choir with Dean West when the buttress fell. It was at a quarter to twelve in the forenoon.

To Mr. Collins (who appeared for the Dean of St. Patrick's and the Cathedral Board).—The pinnacle that fell was not one of those interfered with or renovated by the late Sir Benjamin Lee Guinness. On the back of this pillar, under the flying buttress, there were stones on which were cut the words, "Rebuilt by Henry Kingsmill, 1845." Before it fell it was never suggested to me that the buttress was in a dangerous condition, nor that any imperfection existed in it.

Mr. James F. Fuller, architect to the Board of St. Patrick's Cathedral, deposed, in reply to Mr. Collins, that he had been twenty-five or twenty-six years in the profession. He was architect for eight years under the late Ecclesiastical Commissioners, for a large district extending to nine counties. His duties as such architect were to superintend the erection of churches, of additions to churches, and the execution of repairs on churches. He was architect in the restoration of Limerick Cathedral, and was one of four architects to the Representative Church Body.

By the Coroner.—Was the work of excavation being done under your direct supervision?—As a matter of fact, I was absent when the excavation was made at the buttress that fell, but I do not think it would be fair, on a technical point of this kind, for me to shirk any responsibility.

Do you assume the responsibility of saying that, as far as you saw, the work was well done?—I did not see the excavation at all.

Well, it was done by your direction?—I saw the work after it had fallen.

Have you examined the place thoroughly since?—I was there about an hour after the accident, and have been there every day since. I have thoroughly examined the place.

Did you find the work done well?—Yes, I should say decidedly.

Was there any part of it that you thought unsatisfactory?—The only point I could find fault with was that my orders had been disobeyed.

In what respect?—In the use of mortar instead of cement in the underpinning.

What was the effect of being set in mortar?—The effect we usually apprehend is subsidence at the joints.

Was this effect manifest in the case?—I could not judge that, because of the shaken condition of the masonry which was standing.

If a subsidence had not taken place, would you anticipate the fall of the buttress?—I would not.

I suppose by subsidence you mean what is ordinarily called "settling"?—Yes. I may state that in underpinning we depend more upon the proper wedging up of the work than upon the mortar or cement.

Would you be able to form an opinion as to whether the stonework was well done?—It was.

Have you formed any opinion that would guide us, Mr. Fuller?

I maintain that this old buttress (pointing to a model), which was cased up in 1845, separated from the wall years ago; it may have been centuries ago.

Do you think the persons engaged at the work in 1845 could have seen that crack?—I think they could.

This rotten state of things was undiscovered, according to your evidence?—It was.

But something must have formed the climax; something must have immediately led to the fall. Can you give an opinion as to that?—It is almost impossible to answer that question.

This is the question upon which we ask your opinion?—Goggin himself stated in his evidence, I think, that it must have been caused by the excavation under the pier, but he stated also that in any case it would have fallen, and that is my opinion.

Is there any other thing you wish to express an opinion upon?—There is one point upon which I wish to express a clear and decided opinion. I have been asked out of court whether before the operations commenced at this buttress if, suppose I had been asked, would I have recommended it to be shored, and I wish distinctly to say that, taking into consideration the fact that the buttress was supposed to be bonded to the wall, and that the pressure for which the flying buttress was originally built had been removed, I certainly would not have directed it to be shored. If I had been asked by Mr. Pile whether there was any necessity for shoring it, I should decidedly have said not.

You spoke of Mr. Pile as the contractor?—Yes.

Had Mr. Pile any contract for carrying out any late works on the cathedral?—No, he was working on a schedule of prices, and was paid for what he actually did.

A Juror (Mr. Rafferty).—Had not he articles signed?—Yes, but he was working on a schedule of prices.

Mr. Law.—If he had been told to shore up this buttress would it not have paid him better?—Yes.

And, as a matter of fact, working with cement would have been more profitable to him than with mortar?—Yes, according to his schedule of prices.

And, therefore, he had no motive in using mortar?—According to the prices of the articles it would have paid him better to use cement.

Edward O'Reilly, 65, South Circular-road, examined by Mr. J. O. Byrne, said,—I am a builder and contractor. I know these buttresses for the past fortnight. I saw the one that fell while the works of excavation, &c., were going on.

Did you see anything the matter with the buttress that fell?—I did. About the 5th or the 6th of September, in passing down, I observed a sinking in the arch of the flying buttress to the extent of 1½ in. The same thing was visible in two other arches near it.

Mr. Byrne.—Did you point that out to anybody else? I pointed it out, first to Mr. Conway, a builder, and again to Mr. Brodigan, another experienced builder. I saw how the foundation of the buttress that fell had been excavated, and I thought, having regard to the sinking of the flying buttress, that before the excavations went far it should have been shored with heavy balk timber. I did not see any indication of danger at that time, but on the

* See p. 410, *ante*.

day I brought Mr. Conway (about the 5th or 6th) I thought they were excavating without proper trussing or shoring.

The Coroner, having summed up, the jury retired, and after half an hour's absence the foreman announced that twelve were for holding Mr. Fuller and Mr. Pile responsible. The remaining juror was only for holding Mr. Fuller alone responsible.

The Coroner.—But you are agreed that it was an accident?

The Foreman.—Yes.

At the request of the jury the coroner then drew out the verdict in legal form.

The jury again retired to consider the terms of the verdict, and after a short absence the Foreman announced that they were unanimous in the following:—

"We find that Sarah Egan, John Ward, and James Bolger, were crushed to death at Patrick's Close, on the 14th of September, 1882, by the accidental fall of one of the stone buttresses of St. Patrick's Cathedral, and we consider that the accident was due to the culpable negligence of Mr. Pile, the builder, and Mr. Fuller, the architect, then engaged in works at the said cathedral."

THE INSPECTION OF FACTORIES AND WORKSHOPS.

THIS subject was discussed last week by the trade unionists assembled in congress in Manchester.

Mr. A. W. Bailey (Preston) moved:—

"That, whilst acknowledging the great and beneficial results to the factory and workshop population of the United Kingdom conferred upon them by the legislation of the past half century, this congress is of opinion that a vast amount of juvenile and female labour is still carried on under conditions entirely opposed to the intentions of the factory and workshop laws, and in a manner most detrimental to the physical and moral well-being of the workers engaged, and in many cases producing great danger to the public health. This congress is therefore of opinion that, in order to the better enforcement of these laws, the united trades should continue to urge upon the Government the great and pressing necessity which exists for such an increase of practical working men and women as sub-inspectors as would meet the constant extension of factory and workshop industries, and thus to enforce the observance of the law upon many who now evade it, to the disadvantage of those honourable employers who faithfully carry out the intentions of the Legislature."

He said he did not wish to speak in disparagement of the present inspectors, but it was impossible for them adequately to perform the work entrusted to them. Any one with a practical knowledge of the great increase not only of factories but of domestic workshops, would say it was simply a farce to think that fifty inspectors for the United Kingdom were sufficient. It was the duty of the Government to make such provision as would meet the requirements of any Act they might pass, and he believed that congress would be able to supply the Government with fifty or 100 practical men and women well qualified to act as sub-inspectors.

Miss Wilkinson, upholstress, London, seconded the motion. She said there was nothing so bad as to make a law and not carry it out, and to give men work as inspectors which they were unable to perform was not likely to create respect for the Act. She could not understand the argument against lady-inspectors. If a place was fit for a female to work in, it ought to be fit for a female to inspect.

Mr. M'Lean (Edinburgh) said that they had felt very strongly indeed on the subject of inspectors. It was not so much an increase in the number that was wanted as a change of the class of men. The present inspectors had no sympathy with them because they did not belong to the same class. He thought the congress did well in asking for an additional number of inspectors at a low salary. Had they asked for an additional number of men to be appointed at large salaries, it would have looked as if they were trying to hoist some of their best men into good positions. Their intention, however, was not to get big salaries, but to see that the law was efficiently carried out, in order that their lives, those of their families, and the general public might be protected.

Mr. Bloor (Burslem) said he thought the resolution did not entirely cover the question. There were different degrees of danger among different employments, and what was wanted in connexion with this movement was a thorough searching inquiry, by a commission or Parliamentary committee, in large centres of industry where females and children were employed, to see how far their labour in certain departments was injurious to health.

Mr. Simmons (Maidstone) said the administration of the Act had done a great deal of good towards purifying the brickfields of both juvenile and female labour. It was impossible, however, that inspectors could get through their districts more than twice or thrice in the course of a year. Unless the attention of the inspectors was called to special cases of infraction of the law, they knew that several districts went uninspected for several months in the year. He considered that there was the greatest necessity for additional inspectors.

Mr. Drummond (Glasgow) moved, as an amendment, "That the proposal to appoint women as sub-inspectors should be struck out of the resolution." He did not question the ability of the ladies, but he thought it would be better to get half a loaf rather than none. If they sent their representatives to the House of Commons with their case, before women's rights had been acknowledged in that House, they would get nothing like the increase of inspectors that they wished.

The amendment was not seconded, and the resolution was put and carried unanimously.

THE SANITARY CONDITION OF BAKEHOUSES.

AT the Trade Unions Congress, held in Manchester last week, a resolution was submitted by Mr. Jenkins, of Manchester, instructing the Parliamentary Committee to use their influence with the Government to promote a measure as early as possible to prevent bakehouses being constructed underground, and to insure that bakehouses should be inspected the same as factories, workshops, and mines. He stated that many of the bakehouses were in such a disgraceful condition that they were not fit for the purpose of preparing food, and he called the attention of the delegates to a recent report of a Government official on the state of the London bakehouses if they wished to know what it was that required to be done. The contrast between the inspections of corporations and Government was of the most astounding character, and it was absolutely necessary, if any improvement was to be made, that they should demand more efficient and more regular inspection.

Several delegates suggested that the improvement was a matter rather for corporations than for the Government, and that regulations should be insisted upon when the bakehouses were being built, which would remedy all objection to the charge of their unsanitary state.

Some delegates gave examples of the filthy state of bakehouses, and also the habits of the workmen, and said there were scores of bakehouses in all large towns which, if only the public could see them, they would at once move in this matter in such a determined way that a change would soon be brought about.

Mr. McLean, of Edinburgh, moved an amendment, extending the proposal of the resolution to all trades carried on underground, which Mr. Stevens, Glasgow, seconded.

The resolution was carried.

At the Marylebone Police Court on Saturday last Alfred Alford, baker, Willow-walk, Fortess-road, Kentish Town, was summoned by Mr. James B. Lakeman, Inspector of Factories, for, on the 7th and 8th inst., neglecting to keep his bakehouse in a clean state. There was a further summons for neglecting to affix on his premises the prescribed abstract of the Act 41 Vict., c. 11.

Mr. Lakeman said that the responsibility on the owner of a bakehouse was now much greater under the Act than formerly. The defendant had on his premises two bakehouses, one below the other, and on the days mentioned the lower one was found to be very dirty, and was not thoroughly ventilated. At the foot of the stairs, covered over with sacking and loose boards, was a well about 3 ft. long and 2 ft. wide, and filled with water 7 in. in depth, and at the bottom there was a deposit of matter. The liquid had overflowed the floor of the bakehouse, and stood above 1 in. deep about the ovens.

Alfred Blake, the principal baker in the defendant's employ, said the water in the wall was rain-water which had come from adjoining premises. It sometimes overflowed the floor of the bakehouse, and they got "rid" of it by pushing a cane into the sewer, or dipping it out. The kneading-trough was about 2½ ft. from the well.

Captain Armstrong, one of the Factory Inspectors, stated that on the 8th he visited the place with Mr. Lakeman. A portion of the soil was taken out of the well, and it consisted of black mud and stones. Effluvia arose from it, and it had sewage matter mixed with it.

The magistrate, in the hope that the case would be a warning to other master-bakers, imposed a penalty of 20s. in the first summons, with the costs, and the defendant must pay the costs in the other summons; the well must also be removed and the place limewashed.

DRAINAGE IN FRANKFORT.

SIR,—At p. 388 of the *Builder* of September 23rd, 1882, is a description of the new main sewerage and house-drainage systems carried out by the Messrs. Lindley at Frankfort. The writer does not seem to be aware that the system is, with some exceptions, essentially the "English system," as advocated and taught by myself. The resident engineer, from the first to the completion of the main sewers, was Mr. Joseph Gordon, who went from my works at West Ham, to Frankfort, under Mr. Lindley, and I have been in constant communication with the Messrs. Lindley throughout the whole of their works. I do not desire in any degree to disparage the Messrs. Lindley; I only wish to claim an English origin for the works. Mr. Lindley, sen., had, it is true, sewered Hamburg before any work was commenced at Frankfort, but I think he will admit that he very much perfected his Frankfort works through Mr. Gordon, and by a study of what was being done in England. At this moment I, however, know of no better works of main sewering and house-draining than the works of the Messrs. Lindley at Frankfort, either in England or abroad.

ROBERT RAWLINSON, C.B.

*** Too late for insertion, we have received several long letters on the same subject, notably one from Mr. James Mansergh, complaining of the omission of Mr. Gordon's name in the article referred to, and one from Mr. Gordon himself, giving a history of the undertaking. The latter we will print next week.

BUILDING PATENT RECORD.*

APPLICATIONS FOR LETTERS PATENT.

4,402. S. S. Hellyer, London. Supply and waste valve for baths and lavatories, &c. Sept. 15, 1882.

4,423. W. R. Lake, London. Composition for the preservation of wood, stone, &c. (Com. by A. Bugolich and T. K. Smith, Victoria.) Sept. 16, 1882.

4,430. J. Imray, London. Water-closets, &c. (Com. by R. H. Lecky and J. Hay, Pittsburgh, U.S.A.) Sept. 18, 1882.

4,437. L. C. C. Currie, London. Fastenings for blind-cords or wires. Sept. 19, 1882.

4,438. J. W. Andrews, Whittlesea. Blind-roller furniture. Sept. 19, 1882.

4,449. W. G. Stevens, Bristol. Combined range and register-grates. Sept. 19, 1882.

4,462. J. McPhail, London. Chimney-tops, &c. Sept. 19, 1882.

4,466. E. Edwards, London. Apparatus for closing, &c., window-frames. (Com. by A. Descaves and D. Halut, Paris.) Sept. 19, 1882.

4,479. W. McNicol, Leith. Appliances for securing windows, &c. Sept. 20, 1882.

4,491. W. H. Cooper, London. Drip-course bricks for weathering to brick wall, &c. Sept. 20, 1882.

4,495. W. R. Lake, London. Manufacture of bricks. (Com. by H. R. Dickinson, Hamilton, U.S.A.) Sept. 20, 1882.

4,509. T. H. Noote, London. Drain-pipes. Sept. 21, 1882.

4,514. J. W. Cook, London. Forming temporary partitions in class-rooms, &c. Sept. 21, 1882.

NOTICES TO PROCEED

have been given by the following applicants on the dates named:—

September 19, 1882.

2,275. T. Welton, London. Bedsteads, couches, and chairs, &c. May 15, 1882.

* Compiled by Hart & Co., Patent Agents, 28, New Bridge-street.

2,498. A. M. Clark, London. Door-fasteners. (Com. by C. A. Crougeyer, Detroit, U.S.A., and G. W. Busch, Walkerville, Canada.) May 25, 1882.

September 22, 1882.

2,346. G. H. Haywood, London. Overmantels for chimney-pieces. May 18, 1882.

2,377. H. Kelly, London. Gullies. May 20, 1882.

2,556. G. L. Reynolds, Oakland, U.S.A. Window-screens. May 30, 1882.

ABRIDGMENTS OF SPECIFICATIONS.

Published during the Week ending Sept. 23, 1882.

445. J. Jaffrey, Manchester. Domestic fire-grates and stoves. Jan. 28, 1882. Price 6d.

The bottom and sides of the grate are of solid fire-clay, &c. The smoke, &c., passes through an opening in the back down to a chamber below the bottom of the grate, where it is met by heated air and consumed.

505. J. D. Brunton, London. Apparatus for dressing, turning, and moulding stone, &c. (Partly com. by F. H. J. Frier, Boston, U.S.A.) Feb. 1, 1882. Price 10d.

The circular rotating cutters are placed at such an angle to the stone that they shave or pare it away, instead of splitting or abrading the surface.

715. R. M. Chevalier, London. Venetian blinds. Feb. 14, 1882. Price 6d.

These are made of very thin wood, which, when newly cut, are saturated with glutinous matter, comprised of glue and shellac, dissolved in highly-rectified spirit, to make them tough and pliable. The latter are slung in the usual way, but when drawn up are wound round a roller.

755. R. Weaver, London. Sanitary appliances. Feb. 16, 1882. Price 6d.

The trap and bend of the closet discharge-pipe are so formed that there is always some water retained in the bottom of the pan. The same kind of trap, &c., can be applied to gullies. The pan is ventilated by a pipe rising therefrom before the seat to the roof.

769. T. A. Weston, Stamford, U.S.A. Attaching door-knobs to spindles. (Com. by B. H. Lockwood, Stamford, U.S.A.) Feb. 17, 1882. Price 2d.

The knob-shank has a longitudinal slot extending from he spindle-socket radially through the wall of the shank, and also a transverse slot intersecting the longitudinal slot. A sleeve fits over the shank, and is made slightly eccentric. When the knob is put on the spindle the sleeve is turned, and the shank is gripped tight on the spindle. (*Pro. Pro.*)

770. E. Latham, Birkenhead. Bolt fastenings for doors and windows. Feb. 17, 1882. Price 2d.

Two bolts are attached, one at each end of a lever, which has a central sliding fulcrum. When the fulcrum pin is pressed forward the bolts of the lever enter the recesses in the sash. (*Pro. Pro.*)

781. A. Ashwell, London. Indicating door-fastenings. Feb. 17, 1882. Price 6d.

On the sliding bolt that secures the door on the inside are teeth which gear into a pinion, on the spindle of which, on the outside of the door, is a disc with the word "engaged" on it. This is enclosed in a case, with an opening so arranged that when the door is closed and bolted this word shows.

810. A. S. & C. Buxton & F. O. Ross, London. Ventilating-valve for preventing the bursting of water-pipes during frost. Feb. 20, 1882. Price 6d.

The outlet-pipe of the cistern is fitted with a valve. Beneath this valve a small air-pipe enters the outlet-pipe. The valve can therefore be closed and the water entirely drawn out of the outlet or service pipe without wasting all the water in the cistern.

THE SANITARY EXHIBITION AT NEWCASTLE-ON-TYNE.

IN connexion with the Sanitary Institute's Congress at Newcastle, elsewhere mentioned, an exhibition of sanitary appliances has been opened on the premises of the Tyne Brewery in Bath-lane. There are five classes of exhibits in all. The classes are divided into sections varying in number from six to eleven each. The work of erecting the temporary buildings and of joining them to the main portion and far north end of the brewery has occupied some time, but under the superintendence of Mr. Foggin, the contractor, it was all satisfactorily completed a week before the exhibition opened. The task of arranging the space was supervised by Mr. E. L. Box, the curator of the Sanitary Institute.

Class I. consists of constructive materials, paints, and other protective substances, wall-papers, decorative materials, machinery adapted for sanitary purposes, and washing-machines. The firms exhibiting include Messrs. W. E. Rendle & Co., London; W. B. Wilkinson & Co., John Ismay & Sons, the Sanitary Paint Company, London; the Art Tile Company, London; J. E. H. Andrews & Co., Stockport; Thos. Bradford & Co., Salford; Maurice Gandy, London; Manlove, Alliott, Fryer, & Co., Nottingham; the Turner Gas Co. (Limited), St. Alban's; J. & H. Harrison, Kirsop & Co., and Jas. Mitchell, Newcastle. Messrs. Bambridge & Ormston, Gateshead, exhibit a pair of wrought-iron entrance-gates which gained a prize at the Paris Exhibition last year. The gates are decorated in black and gold. The Whitburn Coal Company have erected a pair of gate pillars with limestone from Marsden. The little structure is ingeniously built of channelling, caps, kerb-stones, and paving blocks. A little further down in the same avenue, Mr. White, of the Great Western Works, Abergavenny, has on view the "Hygeian rock-building composition." A brick structure is here provided, and the strength afforded by the composition is shown by a number of heavy weights suspended from a girder of brickwork, which they fail to break down. An interesting feature to many will be the display of artistic wall and ceiling papers made in this department by Wm. Woollams & Co., of London. The Albissima Paint Company have at the head of the first avenue a cabinet containing samples and show-cards.

Class II. includes sewerage and water-supply fittings, water-closets, dry closets, urinals, sewage treatment, traps, sinks, baths, and lavatories, cisterns, &c. The exhibitors include Messrs. Wm. P. Buchan, Glasgow; Doulton & Co., Lambeth; Harriman & Co., Blaydon; John Fell & Co., Wolverhampton and Newcastle; Hayward, Tyler, & Co., London; Mather & Armstrong; Tylor & Sons, London; H. Watson & Sons; British Sanitary Company, Glasgow; A. T. Angell, London; J. & M. Craig, Kilmarnock; Hugh Stowell Cregeen, Bromley; Dinning & Cook; Rimington Bros. & Co.; Thomasson & Key, Worcester; John Mill & Sons; Wm. White, London; Maguire & Son, Dublin; Straker & Love; and R. Thubron. Messrs. John Fell & Co., Wolverhampton and Newcastle, are the largest exhibitors in this class. Their stand is a most extensive one, and is filled with baths, water-fountains, lavatories, pumps, and chandeliers. Henry Watson & Son show flush-tanks and waste-preventers, by Adams, of York; the "Westminster" steam-pump for raising water, leather hose, with copper standpipe and hydrant, and other articles, many of brass. John Mills & Son exhibit Winn's patent acme syphon cistern for lavatories, &c. Dinning & Cooke show improved stable-fittings for stall and loose box, with ventilating-panel door. Maguire & Son, Dublin, exhibit a couple of Dr. Scott's hot-air disinfecting houses. The interior is provided with baskets for the disinfection of clothing, and, by a very ingenious arrangement, any temperature can be obtained. A structure at this part is formed by the fire-clay bricks made by Messrs. Staker & Love.

Class III. comprises heating apparatus, cooking apparatus, smoke-preventing appliances, lighting, including electric lighting and ventilation. Messrs. Dunning & Co., Percy Works, Newcastle, have secured one of the best stands, and show cast-iron chambers and over-mantels. They have also exhibited a stove, "The Nautilus," in the form of a shell. The mouth of the latter forms the front of the fire, and the products of combustion pass up into the centre or axis, whence, with a spinning motion, they fly out on each side into vertical flues. A warming and ventilating stove from Dresden, intended for churches, schools, and public halls, is exhibited in this class. W. S. Forrest, Grey-street, Newcastle, exhibits the albo-carbon light in all its varieties. The most extensive article in this department of the exhibition is a single-acting Norton ventilating apparatus, worked by a two-horse gas-engine. It is the invention of Captain Norton, of the United States Navy, and consists of two cylinders, each 5 ft. in diameter. It has already been adopted on board the steamer *Salisbury*, built at Sunderland in 1872; on board the *Warwick*, built by Messrs. Wigham Richardson & Co.; in the Chamber of Deputies at Berlin; in one or two of the London hospitals; and at other places. It is claimed for the ventilator that it exhausts 240,000 ft. of air in an hour.

Class IV. is devoted to personal hygiene, foods, and disinfectants; and *Class V.* to miscellaneous exhibits.

The Exhibition will remain open until the 21st of October.

Sydney Exhibition Building destroyed by Fire.—A telegram from Sydney says that the Exhibition Building was totally destroyed by fire on the morning of the 22nd inst. The loss is estimated at 500,000*l.*

APPRENTICESHIPS AND OVERTIME.

AT the Trade Unions Congress, last week, Mr. J. S. Murchie, Manchester, moved the following resolution:—

"That, in the opinion of this congress, the system of working overtime is injurious to the health of the workers, and detrimental to the general welfare of labour; and that it is the duty of every trade unionist to endeavour to minimise the practice by enforcing such extra rates of payment as would prevent systematic overtime. It is also a matter deeply to be regretted that a growing tendency exists among employers in many trades to discourage the employment of indentured apprentices, thereby deteriorating the quality of skilled labour and inflicting serious damage upon our industrial progress."

He said the resolution differed very materially from most motions which had been submitted to the congress during the week, because they did not ask either the Parliamentary Committee or Parliament itself to do anything for them. The resolution pointed out something which they ought to do for themselves. His object in bringing forward the proposition was to get from the meeting some expression of opinion.

Mr. Sedgwick (Leicester) seconded the resolution.

Mr. Drummond (Glasgow) said he thought it to the interests of apprentices in some cases not to be indentured. The remedy was to make the pay for overtime double.

Mr. Evans (Manchester) in following, said that the overtime system as adopted in Manchester had broken down the benefit of the nine-hours system.

Mr. Buckley (Sheffield) said if we were to maintain our prestige as a manufacturing country we should look well into and consider the matter, and

Mr. Jack (Glasgow) said he was of opinion that the subject should be taken back by the delegates to their own districts, there to deal with it.

Mr. Anderson (Manchester) said that it should be the object of every trade unionist in the room to abolish this most abominable system.

Mr. J. Burnett (London) proposed, as an amendment, that the words "trade unionist" in the resolution should be altered into "trade union," and that, instead of minimising the practice as suggested, the following words should be made to follow on after "union," "to endeavour by special restriction or absolute resistance to abolish the practice."

Mr. Mark (Oldham) seconded this amendment, and, upon a vote being taken,

Mr. Burnett's proposition was carried by fifty-six votes against twenty-five given for the original motion.

BREACHES OF BUILDING BY-LAWS AT FINCHLEY.

A QUESTION OF OWNERSHIP.

AT the Highgate Police-court on Monday last, Messrs. Henry Goodwin & Walter Graham, architects and surveyors, of Air-street, Piccadilly, were charged on nine summonses, before Mr. G. Plucknett and Mr. G. N. Minto, as owners of ten houses in Manor Park-road, Finchley, with various breaches of the by-laws of the Finchley Local Board of Health, in connexion with the construction of the said houses.

The case was a peculiar one on the question of ownership, which was the point at issue, and had been adjourned for a month for the production of further evidence on the point, it not being admitted or denied that the defects existed. Considerable trouble had been caused to the Local Board by this property, the original builder of which, a man named Butcher, was summoned at this court some time ago for breaches of the Board's by-laws. Fines amounting to about 36*l.* were then inflicted, but Butcher disappeared without paying the money. It was asserted on the part of the Board that Messrs. Goodwin & Graham, who had been acting as architects, and "financing" the builders, then became owners; but Mr. Graham at the last examination denied on oath that he or his firm were "owners," and gave the name of Mr. Ashwyn, a solicitor, of the Temple, as the representative of the mortgagees, who, he contended, were the owners.

Mr. Ashwyn was now called by the Board, and gave a history of the "financing" of the estate, on which some 2,000*l.* or 3,000*l.* had been advanced by his clients, himself, and Mr. Graham respectively, their claims standing in the order given. Mr. Graham, he said, was "the owner," and would

receive the rents of the property if any were coming in.

The Bench held Messrs. Goodwin & Graham to be the owners, and imposed fines and costs amounting to 29*l.* 8s. upon them.

THE "HYGEIAN-ROCK" BUILDING COMPOSITION.

SIR,—We note an article in your issue of the 9th inst. [p. 350, *ante*] on "Cement, Vulcan, and Asphalte Floors," in which it is mentioned that great difficulty is experienced in finding a material wherewith to construct tanks for the reception of acids. Our "Hygeian-Rock" building composition has been most successfully used by several firms in the Midlands for this purpose, and has been tested and conclusively proved to be acid-proof.

ARTHUR CHARGE.

SYNAGOGUES.

SIR,—Can any of your readers tell me if there is any Jewish synagogue in Europe having a spire to it? I believe there is one at Poonah, in the Bombay Presidency, but want a European precedent. Also, if such exists, where could I obtain a photograph of it?

AN OLD CALCUTTA SUBSCRIBER.

CHURCH-BUILDING NEWS.

Newton Heath.—The new Church of St. Anne, Newton Heath, is approaching completion, and will shortly be consecrated. It will consist of nave, north and south aisles, chancel, organ-chamber, and clergy and choir vestries, the cost of erection being between 4,000*l.* and 5,000*l.* The foundation-stone was laid on October 1st, 1881, by Mrs. Fraser, wife of the Bishop of Manchester, the church being intended to serve that part of All Saints' parish lying nearest to Manchester, and which has for some years been known as St. Anne's district. Sitting accommodation is provided for 600 worshippers. Mr. A. W. Smith, of Manchester, is the architect.

Lindley (near Huddersfield).—The Parish Church of St. Stephen was re-opened for public worship on Sunday, the 3rd inst. The whole of the old pews in the nave and west gallery have been taken out; new floors, seating in best pitch-pine, and new gallery-front have been subsituted. A new porch leading to the western tower has also been added. The cost of the whole has been about 600*l.* All the woodwork has been executed by Messrs. T. Taylor & Son, of Salem-street, Bradford, with local men for the other branches. Mr. James N. Crofts, of Liverpool, was the architect.

Miscellanea.

Exhibition at the Manchester School of Art.—An exhibition has just been opened at the Manchester School of Art, consisting of works from the whole of the schools of the United Kingdom to which prizes have been awarded by the Science and Art Department, South Kensington. The works exhibited cover all the twenty-three stages indicated in the Science and Art Directory, and the collection includes drawings and paintings of the human figure, ornaments from the cast, and original designs, as well as studies of examples, from various museums, and the South Kensington Museum in particular. It is, we are informed, the first exhibition of the kind which has been held in Manchester for the last eighteen years. Entrance to the exhibition is free, and there have been crowded attendances.

Telephonic Appliances during Storms.—The *Deutsche Bauzeitung* gives publicity to an official report, according to which the telephonic connexions (which in Berlin are carried over the roofs upon iron standards) did not suffer any damage during the violent storm which swept over the German capital on the 15th day of August. Although the lightning struck many projecting portions of numerous roofs, such as chimneys, flagstaffs, sandstone figures, &c., the telephonic appliances escaped, notwithstanding the fact that these were, in some instances, quite close to places where the lightning struck. The total length of the wires which have been placed in position in Berlin is about 1,450 miles, and the number of iron standards is 2,450.

Proposed Street Improvements South of Fleet-street.—At the last meeting of the Court of Common Council, Mr. Wheeler (chairman of the City Lands Committee) presented a report with reference to the vacant land on the Thames Embankment. The committee proposed:—1. That the Corporation should give up to the Commissioners of Sewers, for the purpose of throwing into the public street, a piece of land on the south side of Temple-street and Tudor-street, containing about 10,283 superficial feet; 2. That a wedge-shaped piece of land on the north side of Tudor-street, and containing about 1,225 superficial feet, be appropriated by the Corporation when the leases of the premises abutting upon it expire, or the houses are rebuilt; 3. That the line of frontage next Whitefriars-street be set back by the Corporation; 4. That the valve-house on the south side of Tudor-street, belonging to the Gas Light and Coke Company, be set back to the proposed line of street at the expense of the Corporation; 5. That the Commissioners of Sewers continue the widening of Tudor-street by setting back the house between the land belonging to the Corporation and Water-street, the Corporation contributing to the expense thereof the sum of 1,000*l.*; 6. That the Commissioners of Sewers widen the approach to Bouverie-street by taking down the house at the corner of Fleet-street and the north-west end of Bouverie-street, and throwing the same into the public way. With regard to the valve-house, the architect (after conferring with the Secretary to the Gas Light and Coke Company) has estimated the expense of setting back at between 4,500*l.* and 5,000*l.* The Commissioners estimate the cost of effecting the improvement in Bouverie-street and setting back the property in Tudor-street, next to Water-street, at about 13,000*l.* In moving the adoption of the report, Mr. Wheeler said he believed the Corporation would be more than recouped for the piece of vacant land they would give up to make Temple-street 40 ft. wide. They would open new and important lines of thoroughfare from Fleet-street on to the Thames Embankment, and would relieve the overgorged traffic of Fleet-street. The report was adopted by 55 votes to 12, but notice of motion to rescind the resolution arrived at was given.

A New Curtain for Theatres.—Subsequently to the burning of the Ringtheater at Vienna, inventive genius has been greatly stimulated in exerting itself to provide for the safety of a theatre-going public. The iron curtain is a most important and valuable arrangement, but it is somewhat cumbersome, and, above all, expensive, and thus only suitable for large theatres. Its unwieldiness has led to the design of an apparatus which may, in some instances, replace it. The new curtain, which we briefly describe, is formed of a double layer of canvas, between which a large meshed net of stout cord is placed and quilted to the canvas. If at the moment of danger water is made to flow from a pipe which carries the curtain, the latter, as experiments have shown, remains intact, even if exposed to the greatest heat. One of the principal features of the invention is that, by the weight of the water pouring in, the curtain descends automatically, and thus by simply opening the watercock its descent and incombustibility are ensured, and further danger is at once prevented. The expense for such a curtain, moreover, is, as against an iron curtain, comparatively low, and small theatres are thus enabled to provide an efficient protection against fire.—*Iron.*

"Plans and Planning" is the title of the public opening lecture of Professor Roger Smith's courses of Architecture, Construction, and Professional Practice, at University College, London. The lecture, to which admission is free and without tickets, will take place on Wednesday evening next, the 4th of October, at six p.m. It will be fully illustrated. The regular work of the classes, as may have been learned from our advertising columns, begins the following week.

Leakage of Gas-pipes.—As much attention is now being devoted to the generation of diseases caused by the leakage of gases from the sewers, and which has, to some extent, threatened the character of Brighton, it is interesting to know that the South Metropolitan Gas Company have just had the ground opened in several places to see if any leakages arose from the joints of the pipes laid in 1879, and they have found them perfectly tight. The material used for this purpose was Spence's metal.

The Proposed Tower Bridge.—At the last meeting of the St. George's East Vestry, the chairman (Mr. Collyer) asked Mr. Fairclough, of the Metropolitan Board of Works, if he could give the Vestry any information as to the intentions of the Metropolitan Board in reference to the provision of a bridge across the Thames below London Bridge. Mr. Fairclough said he was not in a position to state anything definitely. The engineer to the Metropolitan Board had reported on the subject, and had foreshadowed three alternative schemes, viz., for a subway, a high-level, and a low-level bridge. The report was to be printed, and no doubt it would be presented at the next meeting of the Board, and then be put before the public In view of the circumstance that it was not yet public, he (Mr. Fairclough) thought it would be hardly correct for him to make any further statement regarding it. He might say, however, that the members of the Board seemed anxious to do something, and as the negotiations with the Corporation had fallen through, the Metropolitan Board would have to act independently. Mr. Willey wished to know if any site had been suggested for the bridge. Mr. Fairclough replied that the site suggested was at the Tower. Mr. Willey said that in his opinion a crossing from the Minories would be far too near London Bridge, and do very little good for the East of London. As there was to be a fishmarket at Shadwell, a communication lower down than the Minories would help that and the East of London at once. Mr. Fairclough replied that, speaking with considerable knowledge of the traffic, he was convinced that at the Minories would be the best point for the bridge, as that would be easy of access, and would relieve the enormous traffic over London Bridge.

The Crystal Palace Electrical and Gas Exhibition.—This exhibition will be opened on the 24th of October, and active preparations for the display have commenced. Electricians will be largely represented, although they will be mostly those who did not appear on a former occasion. A few, however, of those who did well in the last display repeat their show in new form, and amongst these are the British Electric Light Company, who will illuminate the Egyptian Court; the Pilsen-Joel and General Electric Light Company, who will light up the Renaissance and Byzantine Courts and the orchestra; Messrs. Girard will take a part of the great transept; and Messrs. Strode a portion of the northern nave. Amongst those who were not in the last exhibition, the most important is Mr. Werdermann, to whom the Alhambra Court has been assigned. The advocates of gas will not be less powerfully in force. The gas interests are taken in charge by a general committee, under the chairmanship of Mr. George Livesey, whose repute as a gas engineer is well merited, and the gas-lighting of the south nave will be undertaken by them, under a plan which will secure the due representation of the various systems of gas-burners. There will be also an important display of gas-stoves.

Theatres.—At the meeting of the Metropolitan Board on this, Friday, the 29th, will be considered a letter from the Lord Chamberlain, forwarding a list of the theatres (twenty-seven) in his jurisdiction, the managers of which have applied for a renewal of their annual licence from the 29th instant, and requesting to be favoured with the opinion of the Board, whether, with reference to the structure of the theatres in question, and the safety of the public, his licence should be issued for them.

TENDERS

For alterations at the Greyhound, Fulham-road, for Mr. R. Dean. Mr. H. I. Newton, architect, 27, Great George-street:—

Bendon	£260 0 0
Forman	207 0 0
Godden (accepted)	197 0 0
Pewterer's Work.	
Warne	£53 0 0
Heath	47 15 0
Hellings (accepted)	40 0 0

For alterations at the Castle Hotel, Child's Hill, Finchley, for Mrs. Randle. Mr. H. I. Newton, architect:—

Godden	£575 0 0
Lamble	477 0 0
Pickersgill	454 0 0
Cook	431 0 0
Auley	430 0 0
Robey (accepted)	375 0 0
Pewterer's Work.	
Burrow	£78 13 0
Hellings	69 0 0
Heath (accepted)	69 0 0

For building the new Church of St. Anne, Bagshot. Mr. H. A. Cheers (late Bromilow & Cheers), of West Kirby, Liverpool, architect:—

Mitchell Bros., Shalford	£5,650	0	0
G. Bullen, Bagshot	5,396	0	0
W. A. Goss	5,395	0	0
John Tyerman	5,378	0	0
Paramor & Son	5,284	0	0
Reavell, Staines	5,147	0	0
Jones & Co.	4,897	0	0
R. B. Barnes	4,840	0	0
James Harris, Woking	4,680	0	0
Martin & Wells, Aldershot	4,530	0	0
S. Woods, Weybridge	4,302	0	0
J. Higgs	4,039	0	0
J. E. Clarke, Poole (accepted)	3,996	0	0

For new church, St. Peter's, Fulham. Messrs. Newman & Billing, architects. Quantities by Messrs. Lee & Son:—

Higgs & Hill	£7,104	0	0
J. & J. Greenwood	6,940	0	0
Goddard & Son	6,920	0	0
Colls & Son	6,645	0	0
Perry & Co.	6,630	0	0
Downs	6,467	0	0
Macey	6,406	0	0
Dove Bros.	6,385	0	0
Gibbs & Flew, Limited (accepted)	6,177	0	0
W. F. Croaker	6,047	0	0

For alterations and additions to two shops, Nos. 191 and 193, High-street, Hounslow. Mr. J. E. Palmer, architect:—

Geo. Reavell, Staines (accepted)	£350	0	0

For the erection of a shop and ware-rooms in the High-street, Ealing, for Mr. E. M. Hope. Mr. Geo. Ashby Lean, architect, Helena-chambers, Ealing:—

Myring	£550	0	0
Penny & Durrant	535	0	0
Adamson & Son	505	0	0
Waters	492	10	0
Nye (accepted)	450	0	0

For new infirmary, Chelmsford. Messrs. Fred. Chancellor and Chas. Pertwee, joint architects:—

Jos. Smith, Witham	£4,421	0	0
J. Grimes, Colchester	4,400	0	0
J. Brown, Braintree	4,200	0	0
H. Gozzett, Woodham Walter	4,040	0	0
W. Wood, Chelmsford	3,916	0	0
Choat & Saltmarsh, Chelmsford*	3,484	0	0

* Accepted.

For the erection of a public hall, club, and shop premises at the corner of St. John's-road and Lavender-hill, Battersea, for the Battersea and Wandsworth Public Hall Company (Limited):—

Rider & Sons	£12,430	0	0
Brass	11,979	0	0
Purnell & Sons	10,508	0	0
G. Shaw	10,295	0	0
Lathey Bros.	10,130	0	0
Appleton	9,990	0	0
Smith	9,871	0	0
James Holloway	9,560	0	0

For building residence and stables on the Bannisters' Park Estate, Southampton, for Mr. A. J. Day. Mr. J. O. Parmenter, architect. Quantities supplied:—
John Crook, Southampton (accepted).

For parochial room for St. Matthew's Church, Lavender-hill, S.W. Mr. W. White, architect, 30A, Wimpole-street. Quantities not supplied:—

T. Gregory, Clapham Junction	£697	0	0
Macey, Battersea Park	598	0	0
Pye, Williams, & Co., Lavender-hill	557	0	0
Burch & Moore, Lavender-hill	553	0	0
J. Holloway, Lavender-hill	545	0	0
E. H. Maplesden, Battersea-rise	540	0	0
Holloway Bros., Shaftesbury Park	528	0	0
Ellis, Lavender-hill (accepted)	458	0	0

For the erection of new Baptist Chapel at Beckenham, Kent. Messrs. H. D. Appleton & E. W. Mountford, architects. Quantities by Mr. E. Crutchloe:—

	General.	Seats and Fittings.
Jerrard	£4,210	£283
F. Higgs	4,056	308
Gregory	3,975	355
Potter	3,480	810
Holliday & Greenwood	3,949	315
Turtle & Appleton	3,644	380
Merritt & Ashby	3,590	369
Howard & Dorrell	3,650	310
Roberts	3,648	270
Shurmur	3,609	333
King & Son	3,485	285
Smith	3,475	353

For the construction of roads and sewers, Wood-green, for Mr. H. A. Wickes, under the superintendence of Mr. William Eve, 10, Union-court, Old Broad-street, E.C.:—

Harris & Wardrop	£2,360	0	0
Killingback	2,241	0	0
Bell	1,924	0	0
Rowley	1,919	0	0
Mayo	1,830	0	0
Dunmore	1,807	0	0
Taylor, Wedmore-street, Holloway*	1,498	0	0

* Accepted.

For the erection of residence at Windsor. Mr. M. B. Adams, architect. Quantities by Mr. H. Lovegrove:—

Goddard	2,947	0	0
Watson	2,913	0	0
Hann	2,859	0	0
Hickinbotham	2,825	0	0
Holliday & Greenwood	2,747	0	0
Martin, Wells, & Co. (accepted)	2,600	0	0

For completing six houses, 13 to 18, Branksome-road, Brixton-rise. Mr. Charles Sewell, architect:—

J. Beal	£1,047	0	0
B. Crook	975	0	0
Turtle & Appleton	925	10	0
O. Craske	898	0	0

For the erection of teachers' residence and additions to Hackenthorpe School, for the Beighton School Board, Derbyshire. Messrs. Rollinson & Son, architects, Chesterfield:—

Sykes	£1,950	0	0
Drabble	1,950	0	0
Chadwick & Co.	1,945	0	0
Greenwood	1,923	0	0
Fisher, Bros.	1,860	0	0
Hardcastle	1,800	0	0
J. Fidler	1,770	0	0
Fidler, Bros. (accepted)	1,625	5	0

For the erection of a brick church, Danesmoor, Derbyshire. Messrs. Rollinson & Son, architects:—

Hays	£575	0	0
Margereson	572	0	0
Roe	561	10	0
Gough	561	0	0
Forrest	557	0	0
Cropper	554	0	0
Tinkler	551	0	0
Potter	496	10	0

For additions and alterations to the union Workhouse, Chesterfield. Messrs. Rollinson & Son, architects:—

Cropper	£1,578	0	0
Forrest	1,497	16	8
Fanshawe	1,470	0	0
Hoole	1,460	13	0
Fisher, Bros.	1,460	0	0
Wright	1,455	0	0
Stevenson	1,450	0	0
Gough	1,411	0	0
Brown	1,404	17	0
Chadwick & Co.	1,400	0	0
Glossop	1,350	0	0
Knowles (accepted)	1,350	0	0

For the erection of additions to Shirland Schools, for the Shirland and Higham School Board. Messrs. Rollinson & Son, architects:—

Mason and Bricklayer's Work.

Cropper	£600	0	0
S. & G. Frisby	554	9	0
Fisher Bros.	543	0	0
Hingley	520	0	0
Hoole	485	0	0
Wain	475	0	0
Roe	439	17	6
Bingham	430	0	0
Margereson (accepted)	410	0	0

Carpenter and Joiner's Work.

Frisby	£365	3	0
Fisher Bros.	360	0	0
Hoole	355	0	0
Smedley	348	0	0
Hall	346	7	0
Whetton (accepted)	335	0	0
Wilson & Wain	328	10	0

Plumber's, &c., Work.

Dixon	£107	13	1½
Burnham	103	18	6
Jones	103	5	9
Frost & Son	101	12	8
Pearson	100	11	6
Frith (accepted)	98	7	0
Peat	97	0	0
Aiken	93	0	0

For alterations and additions to stabling, Wyvol's-court, Swallowfield, Reading, for Mr. R. J. McCabe. Mr. W. Ravenscroft, architect, Reading. Quantities by Messrs. Cooper & Sons, Maidenhead and Reading:—

Wheeler Bros., Reading (accepted)	£410	0	0

For additions, stabling, &c., to Park Villa, Heath-road, Leighton Buzzard, for Mr. Edward Edwards. Mr. Gotto, architect, Leighton Buzzard:—

Adams Bros., Heath, Leighton Buzzard	£394	0	0
William Whiting, Heath, Leighton Buzzard	375	0	0
T. P. Webb, Leighton Buzzard	366	0	0
Amos Miles, Heath, Leighton Buzzard	360	13	0
James Tutt, Leighton Buzzard	348	10	0
D. Cook & Sons (accepted)	340	10	0

For the erection of new stables at Exning Lodge, Exning, Suffolk, for Mr. E. Martin. Mr. John Flatman, architect, Newmarket:—

Wilkes	£2,152	0	0
Pate	1,833	10	0
Kerridge & Shaw	1,787	10	0
Kent	1,721	0	0
Simpson & Ruse	1,695	0	0
Smith	1,620	0	0
Hook & Tebbett (accepted)	1,579	0	0
Cowell	1,515	0	0

For the erection of additional offices at 15, Lamb's Conduit-street, for the Directors of the London Commercial Deposit Building Society. Mr. J. T. Lacey, 10, Buckingham-street, Strand, architect:—

W. H. Pritchard	£352	0	0
W. & H. Salmon	350	0	0
S. Hayworth	339	0	0
Langmead & Way	330	0	0
G. Brown	328	0	0
Thomas & Butland (accepted)	323	10	0

For erecting schools and houses adjoining, Radnor-street, St. Luke's. Messrs. Roumieu & Aitchison, architects. Quantities by Messrs. Welch & Atkinson:—

Dye	£6,984	0	0
Sabey	6,785	0	0
David King & Son	6,588	0	0
Pritchard	6,354	0	0
Nixon	6,311	0	0
Hobson	6,186	0	0
Nightingale	6,091	0	0
Brass	5,811	0	0

For alterations to 42, Cannon-street, for Messrs. Sterne & Co. Mr. John Whichcord, architect:—

David King & Son	£1,578	0	0
E. Lawrence	1,267	0	0

For the erection of an eight-quarter malting, Epsom, for Mr. C. Dagnall. Mr. Arthur Kinder, 11, Queen Victoria-street, architect. Quantities by Mr. Harold A. Kinder:—

C. J. Paine, Worcester Park	£485	0	0
G. Harda, Ewell	448	15	0
S. J. Evans, Carshalton (accepted)	398	0	0

For Maidstone hospital for infectious diseases. Messrs. Hubert Benstead, Maidstone, and W. Leonard Grant, Sittingbourne, joint architects:—

Bowyer, Upper Norwood	£4,444	0	0
Davis, Maidstone	4,308	0	0
Hayward & Paramor, Folkestone	4,300	0	0
Jones & Co., Gloucester	4,180	0	0
Paramor & Son, Margate	4,020	0	0
Harris & Son, Tunbridge Wells	4,000	0	0
Swain, London	3,956	0	0
Vaughan, Maidstone	3,747	0	0
Cox Bros. Maidstone	3,725	0	0
Naylar, Rochester	3,723	0	0
Geere, Stttingbourne	3,585	0	0
Clements, Maidstone	3,691	0	0
Avard, Maidstone (accepted)	3,630	0	0

For building two houses and shops in the Burdett-road, London, for Mr. Edward Good. Mr. John Hudson, architect:—

J. & H. Cocks, Mile-end	£1,114	0	0
Morton & Son, Stratford	1,053	0	0
Mark Gentry, Stratford	1,020	0	0
Hearle & Son, St. George's	945	0	0
Parrish & Hawker, Burdett-road*	819	0	0

* Accepted.

For general repairs to seventeen houses in the Tenter-ground, Goodman's-fields, for Mr. J. Davis. Mr. John Hudson, architect:—

Outhwaite & Son	£590	0	0
Read & Son	459	0	0
Gladding	420	0	0
Russell, Hackney (accepted)	399	10	0

For building stables, &c., at the Rising Sun public-house, Romford-road, East Ham, Essex. Mr. John Hudson, architect:—

Mark Gentry	£324	0	0
Norton & Son	334	0	0
J. & H. Cocks, Mile-end	273	0	0

For making up Crescent-road, Crouch-end, for the Hornsey Local Board. Mr. J. De Courcy Meade, surveyor:—

Bloomfield, Tottenham	£1,150	0	0
Jackson & Son, Finsbury Park	1,125	0	0
Pizzey, Crouch-end	952	0	0
McDowell & Dawson, Stoke Newington	919	0	0
Strachan & Co., Wood-green	905	0	0
Dunmore, Crouch-end	794	0	0
McKenzie, Williams, & Co., North-buildings, South-place, Finsbury*	791	0	0

* Accepted.

For alterations and additions at the Northcote tavern, Battersea-rise, and stables adjoining, for Mr. Geo. Philip. Mr. Geo. Treacher, architect:—

John Beale (accepted)	£768	0	0

For pulling down and rebuilding the Yorkshire Grey tavern and shop adjoining, Langham-street, for Mr. T. Maguire. Mr. Geo. Treacher, architect. Quantities supplied by Mr. J. F. Wesley, Forest-gate:—

John Beale (accepted)	£3,130	0	0

For house at Ashtead, Surrey. Mr. H. C. Boyes, architect:—

G. Green	£1,776	0	0
M. Haisman	1,729	0	0
Gould & Brand	1,539	0	0

For a pair of semi-detached houses in the Elmfield-road, Bromley, Kent. Mr. St. Pierre Harris, architect. Quantities by Mr. C. Stanger:—

Wood	£2,817	0	0
Crossley	2,744	0	0
Payne	2,734	0	0
Grubb	2,676	0	0
Haisman	2,669	0	0
Taylor & Parfitt	2,555	0	0
Arnaud & Son	2,554	0	0
Balding	2,493	0	0
Taylor & Son	2,398	0	0

For additions and alteration to the Gordon Arms, Chislehurst, Kent. Mr. St. Pierre Harris, architect:—

Grover	£130	0	0

For erecting south boundary fence at the new portion of the cemetery for the parish of Tottenham. Mr. F. W. Searle, architect:—

Rowe	£1,925	0	0
Wells	1,799	0	0
Harris & Wardrop	1,744	0	0
Chapman	1,659	10	0
Bird & Co.	1,580	0	0
Johnson Bros.	1,575	0	0
Lion Foundry Company (ironwork only)	693	9	8

For house at Mickleham, Surrey. Mr. John Norton, architect. Quantities by Mr. S. J. Thacker:—

Scofield	£7,390	0	0
Boyce	7,390	0	0
Kirk & Randall	7,300	0	0
Peto Bros.	7,289	0	0
Goddard	6,990	0	0
Sanders	6,940	0	0
Clark	6,832	0	0
Lawrance	6,719	9	9

For addition to the Springwells Brewery at Kegworth, near Derby. Mr. John Jackson, St. Alban's-chambers, Nottingham, architect:—

J. W. Vesty, Kegworth	£259	7	6
John Sharman, Kegworth	155	10	0
Pepper & Bramley, Kegworth	215	13	4
J. & G. Wilders, Kegworth (accepted)	210	0	0

For additions and alterations to Henfield Lodge, Henfield, Sussex, for Major Borrer. Mr. William Buck, architect, Horsham:—

Martin, Henfield	£1,452	10	0
Roberts, Henfield	1,429	0	0
Snewin & Son, Worthing	1,415	0	0
Pannett, Bros., Horsham	1,386	0	0
Hooker, Portslade	1,380	0	0
Woolgar & Son, Horsham	1,313	0	0
Miles, Portslade	1,250	0	0
Redford, Horsham (accepted)	1,246	5	0

For Worsley private street improvements, consisting of the sewering draining, levelling, and laying foundations in Fereday-street, Victoria-street, Brackley-street, and Louisa-street, and in levelling and laying foundations, &c., in Granville-street, Dagmar-street, and Thorpe-street, for the Barton-upon-Irwell Sanitary Authority. Contract No 12. Quantities supplied by the engineer, Mr. John Price, C.E. :—

M. Naylor, Hulme	£1,559	13	0 !
G. Freeman, Hollinwood	1,350	12	0
F. Dawson, Bury	1,660	7	10
G. Unsworth, Moss Side	1,083	8	11
Sharples & Watson, Farnworth	1,039	6	0
J. Jackson, Walkden	1,014	12	8
J. Oakes, Kearsley	977	18	1
W. Hayes, Bolton	970	12	8
J. Mackay, Hereford	917	0	0
W. Pollitt, Bolton	889	13	1
J. Randall, Weaste	859	16	9
E. Bird, Chorlton (accepted)	854	0	0 !

For Worsley private street improvements, consisting of sewering, draining, levelling, and laying foundations in Back Granville-street, Back Fereday-street, Back Chaddock-road, and Back Wardley-street, for the Barton-upon-Irwell Sanitary Authority. Contract No. 13. Quantities supplied by the engineer, Mr. John Price, C.E. :—

M. Naylor, Hulme	£380	5	0
G. Freeman, Hollinwood	376	5	0
D. Holt, Bolton	332	18	6
J. Mackay, Hereford	289	0	0
G. Unsworth, Moss Side	284	4	6
W. Hayes, Bolton	276	16	11
F. Dawson, Bury	262	2	10
J. Oakes, Kearsley	254	5	6
J. Jackson, Walkden	247	17	7
J. Randall, Weaste	246	9	0
Sharples & Watson, Farnworth	245	0	0
W. Pollitt, Bolton	234	4	2
E. Bird, Chorlton (accepted)	230	0	0

For the plant and machinery of a new 60-quarter brewery, upon the Yorkshire system, for Mr. John Smith, Tadcaster, York. Messrs. Scamell & Colyer, engineers, 18 Great George-street, Westminster :—

Contract No. 3.—Boilers.

Tannett, Walker, & Co., Leeds	£1,685	0	0
Galloway & Sons, Manchester	1,470	0	0
R. Taylor & Sons, Marsden	1,440	0	0
Bradley & Craven, Wakefield	1,407	0	0
G. Waller & Co., London	1,399	0	0
Witham & Co., Leeds	1,350	0	0
Thornewill & Warham, Burton-on-Trent	1,290	0	0
Piggott & Co., Birmingham	1,258	0	0
Holdsworth & Sons, Bradford (accepted)	1,162	0	0

Contract No. 4.—Millwrights.

Bradley & Craven, Wakefield	£8,673	0	0
Oxley, Frome	7,100	0	0
Thornewill & Warham, Burton	7,095	0	0
H. Woods & Co., Manchester	7,010	0	0
G. Waller & Co. London	6,693	0	0
Wilson & Co., Frome	6,223	0	0
Pontifex & Wood, London	6,065	0	0

Contract No. 5.—Coppers.

H. Pontifex & Sons, London	£4,073	0	0
Shears & Sons, London	3,264	0	0
Bennett & Sons, London	3,225	0	0
Wilson & Co., Frome	2,794	0	0
Siddley & Co., Liverpool	2,770	0	0
Bindley & Briggs, Burton	2,750	0	0
Pontifex & Wood, London	2,715	0	0
Ramsden, London (accepted)	2,636	0	0

Contract No. 6.—Slate mason.

Braby & Co., London	£2,160	0	0
J. & J. Sharp, London	1,975	0	0
Carter, Liverpool	1,960	0	0
Ashton & Green, London	1,950	0	0
J. Stirling, London	1,930	0	0
Brindley & Co., London	1,929	0	0

No fermenting-tuns included in this contract.

Contract No. 7.—Pipes.

Bennett & Son, London	£5,725	0	0
Thornewill & Warham, Burton	5,656	0	0
Brindley & Briggs, Burton	5,350	0	0
Wilson & Co., Frome	5,269	0	0
Pontifex & Wood, London	4,009	0	0

Contract No. 8.—Refrigerators.

Lawrence & Co., London (accepted)	£716	0	0

Note.—The results of No. 1 contract, "Buildings," and No. 2 contract, "Girders, &c.," have been previously announced, viz. :—

No. 1. Armitage & Hodgson, Leeds	£22,103	0	0
No. 2. Dawson & Nunneley, Leeds	10,699	0	0

For the erection of new Wesleyan Chapel at Ryde, Isle of Wight. Mr. Charles Bell, architect. Quantities by Mr. H. Lovegrove, 26, Budge-row, Cannon-street :—

Newman	£5,990	0	0
Ward	5,315	0	0
Martin, Wells, & Co.	5,189	0	0
Breader	4,950	0	0
Jenkins Bros.	4,780	0	0
Harris & Son	4,770	0	0
Evans Bros.	4,753	0	0
Gregar	4,744	0	0
Sibley	4,736	0	0
Jones	4,650	0	0
Cooper	4,628	0	0
Barton (accepted)	4,310	0	0
Morris	4,100	0	0

For the erection of residence, stables, &c., at Grimsby, for Mr. Alderman Smethurst, J.P. Mr. Charles Bell, architect. Quantities by Mr. H. Lovegrove :—

Emerson	£4,984	4	11
Smith	3,949	14	0
Guy	3,942	5	10
Willows	3,828	9	0
Doughty	3,614	16	0
Snowden	3,612	19	0
Fletcher	3,604	6	6
Thompson	3,577	14	0
Chapman	3,395	12	4
Topham	3,385	18	0

For the erection of three warehouses in Smithfield. Mr. W. Cook, architect :—

B. Brown	£5,682	0	0
G. Crabb (accepted)	5,516	0	0

TO CORRESPONDENTS.

M. J. L. (we cannot find space. Moreover, the assertion that colour is used is substantiated by other correspondents). J. O. R. (should have sent names and amounts). E. C. (under our mark). J. H. C. M. (received). F. W. C. (received. Shall appear). Architect (we cannot pretend to write letters in reply). J. G.—C. B. K.—G. R.—O. R.—H. H. R.—J. M.—S. & C.—C. P.—J. P.—J. C.—J. A. H.—G. A. L.—W. S.—J. H.—R. F. G.—J. W. C.—J. B.—O. C.—C. B.—H. C. H.—S. M. & Co.—W. B.—H. I. N.—B. G.—H. H.—W. de G. B.—W. N. A.—W. R.—S. & G.—W. W. L.—J. B. C. C. H.—W. P.—D. K. & Son.—W. C. C.—W. H. C.—A. V.—P. G. S.—Mrs. F. R. W.—J. N.—T. R. S.—M. & Co.—S. H.—F. W. H.

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